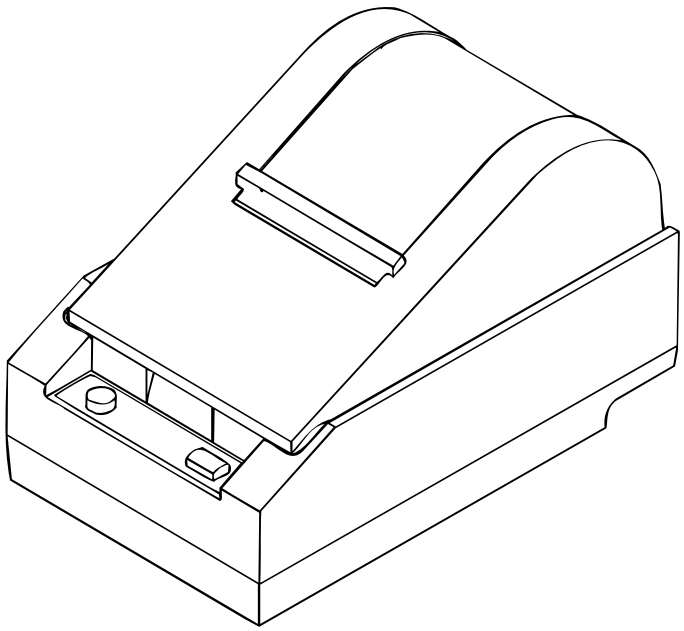
TECHNICAL MANUAL

(without price)

TM-T60 Series
TM-T80 Series
(TM-T85)

FEB. 1997



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CASIO®

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FEATURES AND BASIC SPECIFICATIONS

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1.1 FEATURES

The TM-T60/T80 series has been developed to function as a 1-station printer for ECR, POS, weights/measurements output device, and ticket vending machine. It is a low noise, compact, light weight, and high reliability product, that is very easy to use, and which fully responds to the needs of customers using CASIO products.

Line up of this series is as follows:

TM-T60 series

- Serial interface version (TM-T60)
- Parallel interface version (TM-T60P)

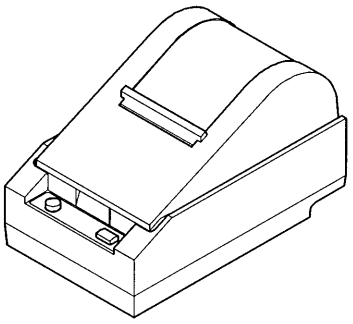
TM-T80 series

- Serial interface version (TM-T80)
- Parallel interface version (TM-T80P)

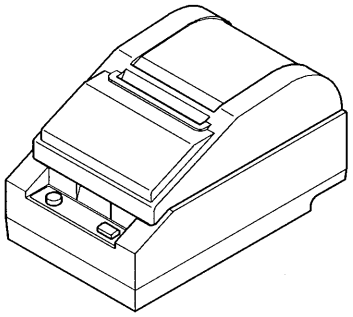
Main features of the series are as follows:

- Compact and light design
- High speed printing of 12 lines/s (T60 series), 9 lines/s (T80 series) (in case of 12×24 font)
- Low noise because of thermal printing method
- Minimum operating parts assure high reliability
- Simple maintenance of head cleaning, etc.
- Conforms to ESC/POS™, producing highly general-purpose nature of its control
- Interface, drawer-kick, and power cable can be wired on any of the 4 sides: top, bottom, left, right side.
- The power switch is located on the front panel of main unit, which makes it easy to operate and imposes no restrictions on the side and rear.
- Permits printing of bar codes.
- Characters can be rotated through 90 degrees.
- Repetitive operation and copy printing can be done, using macro definitions.
- Built in interface for drawer kick allows control of 2 drawers. (The drawers are used only when drawer-kick connector is covered).
- Auto cutter can be set as a factory option (T80 series only).

TM-T60/T80 series (without auto cutter)



TM-T80 series (with auto cutter)



1.2 BASIC SPECIFICATIONS

1.2.1 Printing Specifications

Item	Details	TM-T60 series	TM-T80 series
Printing method		Line thermal printing method	
Dot density		180 dpi	
Printing direction		Single direction feeding by friction feed (manual reversing not possible)	
Print width		54mm, 384-dot position	72mm, 512-dot position
Number of print digits	Font A	32 digits	42 digits
	Font B	42 digits	56 digits
	Kanji	16 digits	21 digits
Character spacing	Font A	0.28mm	
	Font B	0.28mm	
	Kanji	0mm	
		Programmable with commands	
Printing speed	1/6 Inch line feed	Anout 12 lines/s	Anout 12 lines/s
	1/9 Inch line feed	About 18 lines/s	About 13 lines/s
		But may become slower, due to the setting of data transfer speed or the combination of commands.	
Paper feeding speed		About 2 inch/s (about 50mm/s)	About 1.5 inch/s (about 38mm/s)
Line feeding width		Default 1/6 inch (4.23 mm). Programmable with commands (min 1/360 inch).	

Table 1.1

1.2.2 Character Specifications

Character type

Alphanumerics : 95
Extended graphics : 128 characters × 2 pages
International characters : 32
(Kanji version only -JIS No.1, No.2 standards)

Character configuration

Font A : 12 × 24
(including horizontal 2-dot space)
Font B : 9 × 17
(including horizontal 2-dot space)
Kanji : 24 × 24
Font A is selected, by default.

Character dimension

<T60 series>

Character style / Character size / Number of dots	Standard		Vertically magnified		Horizontally magnified		Uniformly magnified	
	W×Hmm	Number of digits	W×Hmm	Number of digits	W×Hmm	Number of digits	W×Hmm	Number of digits
Font A 12×24	1.41×3.39	32	1.41×6.77	32	2.82×3.39	16	2.82×6.77	16
Font B 9×7	0.99×2.40	42	0.99×4.80	42	1.98×2.40	21	1.98×4.80	21
Kanji 24×24	3.39×3.39	16	3.39×6.77	16	6.77×3.39	8	6.77×6.77	8

<T80 series>

Character style / Character size / Number of dots	Standard		Vertically magnified		Horizontally magnified		Uniformly magnified	
	W×Hmm	Number of digits	W×Hmm	Number of digits	W×Hmm	Number of digits	W×Hmm	Number of digits
Font A 12×24	1.41×3.39	42	1.41×6.77	42	2.82×3.39	21	2.82×6.77	21
Font B 9×7	0.99×2.40	56	0.99×4.80	56	1.98×2.40	28	1.98×4.80	28
Kanji 24×24	3.39×3.39	21	3.39×6.77	21	6.77×3.39	10	6.77×6.77	10

Note: The above figures do not include the space between characters.

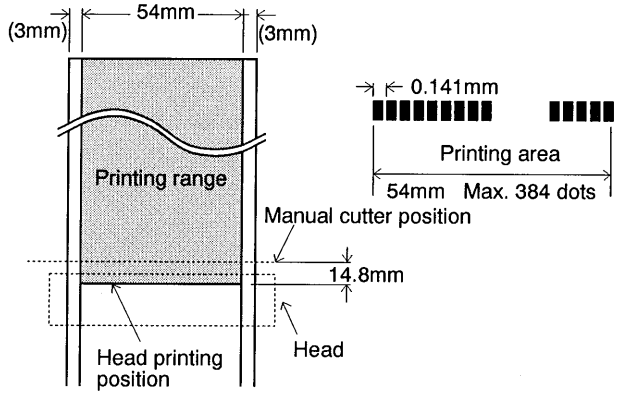
Table 1.2

1.2.3 Paper Specifications

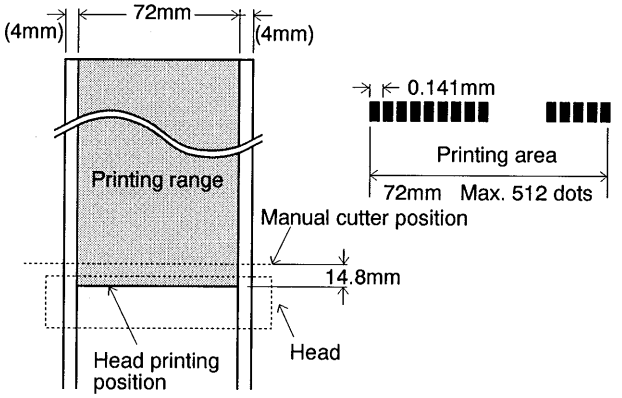
Paper sort : Prescribed thermal paper
Paper thickness : Thermal paper 65 ± 5μm
Paper type : Roll paper
Paper width : 60 ± 0.5mm (T60 series)
80 ± 0.5mm (T80 series)
Outer dimension : max. φ83mm
Prescribed paper : Thermal paper
T60 series roll paper No.: NTP060-80
<Nakagawa Seisakusho Ltd.>
T80 series roll paper No.: NTP080-80
<Nakagawa Seisakusho Ltd.>
[Original paper No.: TF50KS-E]
<Jujo Seishi Ltd.>

Printing area

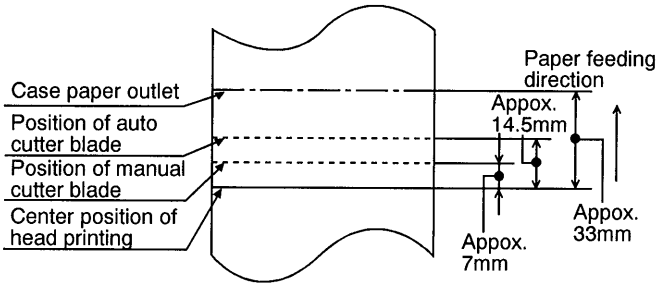
<T60 series>



<T80 series>



<Head position of T80 series with auto cutter>



(The values in this figure are central values of design. Allow certain margin for sagging, deviations, etc. of paper.)

Note: All values are typical.

Figure 1.1 Printing area

Roll paper core

Inner diameter 12mm
Outer diameter 18mm

Note: Never stick the paper onto the core.

- To purchase the prescribed paper, either contact the CASIO representative or refer to CASIO specification.

1.2.4 Electrical Specifications

Power supply voltage : DC 24V ± 7%
Current consumption
<**While operating**>
Average : About 1.3A (during 30% print duty)
Peak : About 6.0A (during 100% print duty)
<**When idle**>
About 100mA

1.2.5 Interface

1.2.5.1 Serial interface

(1) Serial RS-232C interface

Synchronization	Asynchronous
Handshake	By DTR/DSR or XON/XOFF control
RS-232C Signal level	MARK: −3V ~ −15V logical: 1
	SPACE: +3V ~ +15V logical: 0
Stop bit	1 or more bits

(2) Interface connector (user's side)
D-sub 25-pin connector

(3) Connector signals assignments

Pin No.	Signal name	I/O	Meaning of signal
1	FG		Safety earth
2	TXD	O	Transmission data
3	RXD	I	Reception data
6	DSR	I	Data set ready
20	DTR	O	Data terminal ready
7	GND		Signal GND

Table 1.3

(4) Serial interface timings
<**Reception**>
Control with DTR/DSR or XON/XOFF is selectable. DTR is changed and XON/XOFF is transmitted conforming to the following status.
[DTR MARK]
- Error status from the time of power ON up to reaching data receivable condition.
- When the remainder capacity of buffer reaches 10 bytes.

[DTR SPACE]
- When data becomes receivable after power ON
- When the remainder capacity of buffer reaches 20 bytes.

[XON transmission]
- When data becomes receivable after power ON
- When the remainder capacity of buffer reaches 20 bytes.

[XOFF transmission]
- When error status occurs
- When the remainder capacity of buffer reaches 10 bytes

<**Transmission**> **(status data transmission)**
When control by DTR/DSR is selected, data is transmitted after confirming that DSR is SPACE. When control by DTR/DSR is not selected, data is transmitted regardless of the state of DSR.

(5) Outer view of the rear of main unit (connectors)

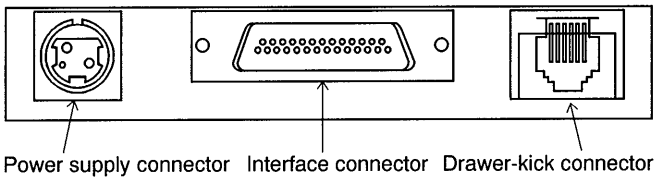


Figure 1.2 Outer view of connectors

(6) Power connector
See 1.2.5.2 "Parallel Interface", item (6) Power connector.

(7) Drawer-kick connector (modular connector)
See 1.2.5.2 "Parallel Interface", item (7) Drawer-kick connector (modular connector).

1.2.5.2 Parallel Interface

(1) Specifications (conforms to CENTRONICS)

Data transmission	8-Bit parallel
Synchronization	With external supply $\overline{\text{STROBE}}$ pulse
Handshake	With $\overline{\text{ACKNLG}}$ and BUSY signals
Logic level	All signals are TTL level compatible
Connector	ADS-B36BLFDR176 (Honda Tsushin Kogyo) or equivalent

(2) Interface connector terminal assignments and signal functions (printer side)

Pin No.	Signal name	I/O	Function
1	$\overline{\text{STROBE}}$	I	This is a strobe pulse to read the data. Its regular status is High; and data is read after it becomes Low. Its pulse width at power receiving terminal must be 0.5 μs or more.
2	DATA1	I	Indicates the parallel data of bits 1 to 8. High indicates that the data is 1, and Low indicates that the data is 0.
3	DATA2	I	
4	DATA3	I	
5	DATA4	I	
6	DATA5	I	
7	DATA6	I	
8	DATA7	I	
9	DATA8	I	
10	$\overline{\text{ACKNLG}}$	O	Indicates that the next data is receivable. Its regular status is High, and it outputs Low pulse of about 10 μs.
11	BUSY	O	Indicates whether or not data is receivable. High indicates that data is not receivable, and Low indicates that data is receivable.
12	PE	O	Indicates paper/no paper. High indicates no paper, and Low indicates paper exists.
13	SLCT	O	This signal is pulled up to 3.3KΩ +5V.
14	$\overline{\text{AUTO FEED XT}}$	I	If this signal is Low at the time of executing CR command, line feed is automatically executed after printing.
15	NC	–	
16	GND	–	Signal ground
17	CHASSIS GND	–	Chassis ground
18	NC	–	
19~30	GND	–	Signal ground
31	$\overline{\text{INST}}$	I	Printer hardware reset signal. Its regular status is High, and a Low pulse of 50 μs or more sets the same state as at the time of power ON.
32	$\overline{\text{ERROR}}$	O	Indicates whether or not it is error status. This signal turns Low in the following cases. • Between power ON and end of initialize operation • During self test • While off-line • While in error status
33	GND	–	Signal ground
34	DRAWER KICK STATUS	O	This signal is pulled up to 3.3KΩ +5V. The status signal of drawer-kick connector is directly output here.
35	+5V	O	This signal is pulled up to 3.3KΩ +5V.
36	NC	–	

Table 1.3

Table 1.3 (*Continued*)

※1. For interface cabling, always use a twisted-pair cable for each signal, and connect the return side to signal ground level. Further, be sure to shield the cable and connect it to the main unit ground of center machine.

※2. All interface conditions are based on TTL levels. Building up and going down time of each signal shall be 0.2 μs or lesser.

※3. Data must be never transmitted, ignoring the $\overline{\text{ACKNLG}}$ and BUSY signals. (Data must be transferred to this printer after confirming $\overline{\text{ACKNLG}}$ signal, or while the BUSY signal is Low).

※4. The interface cable must be shortest possible.

(3) Parallel interface timing chart

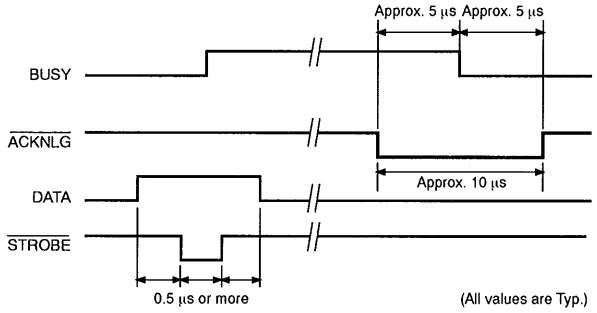


Figure 1.5

(4) Data control

Data reception is controlled by $\overline{\text{ACKNLG}}$ or BUSY signal. The following is when BUSY signal turns High:

- Between power ON and end of initialize operation
- During self test
- During data entry
- Off-line status
- Receiving buffer full status
- Error status

※• Receiving buffer full status implies 10 bytes or lesser space in the receiving buffer.

• The received data is ignored while the space in receiving buffer is 0 bytes.

(5) Outer view of the rear side of main unit (connectors)

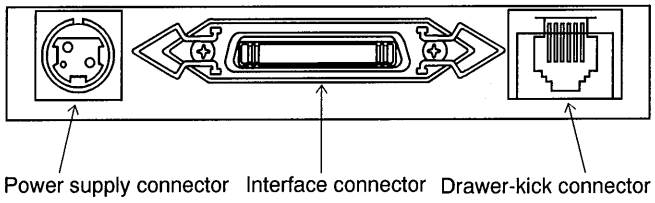


Figure 1.6 Outer view of connectors

(6) Power connector

This connector is used to connect an external power source.

<**Pin layout**>

Pin No.1 : DC+24V
Pin No.2 : GND
Pin No.3 : Not connected
SHELL : Connected to the frame ground (F.G.) of printer.

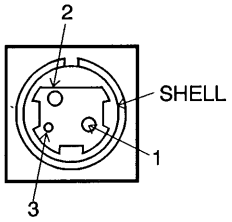


Figure 1.7

<**Model**>

User's side :TCP8927-63-1110 connector (Hosiden)
2-Core braided shield cable (AWG22×2)
Printer side :TCP7960-53-2010 connector (Hosiden)

Note: External power supply must be turned ON after connecting the power connector to it.

(7) Drawer-kick connector (modular connector)

<**Pin layout**>

Printer side connector : TM5RJ2-66 (Hirose)
User's side plug : General 6-pin modular jack (telephone jack RJ11)

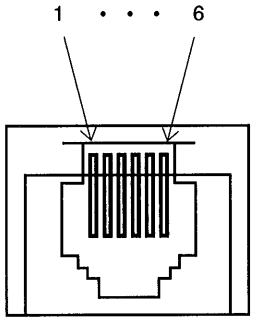


Figure 1.4

Pin No.	Signal name	Sender	Connected to	Function
1	FG	—	Cache drawer	Frame ground
2	L1(–)	Printer	Cache drawer	Drawer-kick drive signal L1
3	SW(+)	Cache drawer	Cache drawer	Connected to the (+) side of open/close detection switch of cache drawer. On the printer side, it is pulled up with 10k ohm resistance.
4	L(+)	Printer	Cache drawer	DC +24V for drawer kick is supplied.
5	L2(–)	Printer	Cache drawer	Drawer-kick drive signal L2
6	SW(–)	—	Cache drawer	Connected to the (–) side of open/close detection switch of cache drawer. On the printer side, it is connected to the signal ground.

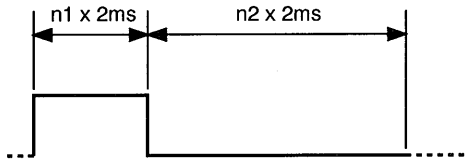
Table 1.6

<**Drawer-kick drive signal**>

The pulse specified by ESC p is output.
In serial interface, the host can know the SW (+) status by using ESC u command. In parallel interface it can be known from pin 34 of the interface connector.

<**Electrical characteristics**>

- Signal output current : Max−1A (must be 510ms or lesser)
- Power supply output voltage : DC24V (TYP)
- Power supply output current : Max 1A (must be 510ms or lesser)
- Output waveform



Note:

- No output while printing.
- Drawer-kick drive signals L1 and L2 cannot be concurrently output.
- Solenoid resistance value must be 24Ω or more.
- The drive of the drawer must be as shown below.

$$\frac{n1}{n1 + n2} \leqq 0.2$$

<**Drawer open/close signal**>

SW (+) signal level : Low=0 to 0.5V
: High=3 to 5V

1.2.6 Switches

1.2.6.1 Panel switches

Power switch : Lock type push button

[Function]

Turns the power supply (ON and OFF).

[Cautions]

- All the contents of RAM are initialized by cutting off the circuit power supply.
- Do not touch the power button while the printer is operating.

Paper feed switch : Non-lock type push button

[Function]

When this button is pressed, the paper is fed one line, according to the currently set amount of line feed. If the button is pressed for more than 200ms, the paper is continuously fed out until the button is released. If the set amount of line feed is zero, the paper is fed out only while the button is pressed.

[Cautions]

- If this button is pressed while execution wait status has been set with macro execution command, the defined macro is executed.
- While printing or in case of error, paper can be fed with this button, except while execution wait status has been set with macro execution command.
- Even if the residual amount of paper is less than the amount set for near-end, paper can be fed out with this button.
- Paper cannot be fed while the printer cover is open.

1.2.6.2 DIP Switch

(1) Serial interface specification

Function

DIP SW1	ON	OFF
1	Ignored in case of receiving error.	"?" printed in case of receiving error.
2	Data buffer 45 bytes	Data buffer 4K bytes
3	XON/XOFF control	DTR/DSR control
4	With parity	Without parity
5	Even parity	Odd parity
6	Baud rate switch over (see Table 1.8)	
7		
8	Density switch over (see Table 1.9)	
9		
10	Spare	

Table 1.7 DIP Switch (bottom of the case)

Notes

- DIP switch 10 should be always OFF.
- The DIP switch is valid only at the time of turning ON the power supply. Changing its settings later makes no changes.

DIP SW1-7	DIP SW1-6	Baud rate
ON	ON	1200 dps
ON	OFF	4800
OFF	ON	9600
OFF	OFF	19200

Table 1.8 Transfer speed selection

DIP SW1-9	DIP SW1-8	Level	Density
ON	ON	1	LIGHT
OFF	OFF	2	⋮
OFF	ON	3	⋮
ON	OFF	4	DARK

Table 1.9 Print density selection

Note: This switch is used for changing the print density, mainly in bar code printing.

(2) Parallel interface specification

Function

DIP SW1	ON	OFF
1	Auto line feed always valid	Auto line feed conforms to AUTO FEED XT signal
2	Data buffer 0 bytes	Data buffer 4K bytes
3	Switch over of print density (see Table 1.11)	
4		
5	Spare	

Table 1.10 DIP Switch (bottom of the case)

Note:

- DIP switch 5 should be always OFF.
- The DIP switch is valid only at the time of turning ON the power supply. Changing its settings later makes no changes.

DIP SW1-4	DIP SW1-3	Level	Density
ON	ON	1	LIGHT
OFF	OFF	2	⋮
OFF	ON	3	⋮
ON	OFF	4	DARK

Table 1.11 Print density selection

Note: This switch is used for changing the print density, mainly in bar code printing.

1.2.7 Indicators

Panel LED

Power supply (POWER) LED (green)

ON : Power is being normally supplied.
OFF : Power is not being normally supplied.

Error (ERROR) LED (red)

ON : If this LED lights while PAPER OUT LED is OFF, it indicates that the printer cover is not closed. If it lights while PAPER OUT LED is ON, it indicates that the printer went OFF-LINE after detecting a paper near-end.
OFF : Regular mode
Flickering : This LED starts flickering in case of other errors, as given in Table 1.12.
: It also starts flickering when print wait status is set by macro execution command, as given in Table 1.13.

Near-end (PAPER) LED (red)

ON : Near-end of roll paper detected.
OFF : There is roll paper.

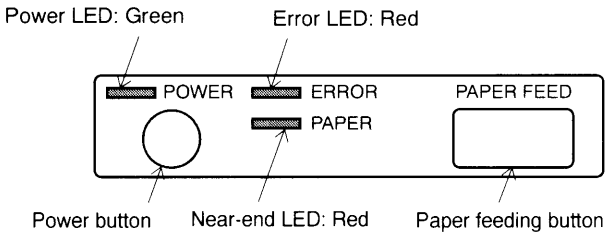


Figure 1.9 Panel switches and indicators

Error display

Error name	Flickering pattern	Recovery condition
RAM check error	150ms ON OFF 150ms	Recovery impossible
Faulty transistor	150ms 1800ms ON OFF 300ms 150ms	Recoveryb impossible
Power supply voltage, high voltage error	150ms 1500ms ON OFF 150ms 300ms 150ms	Recovery impossible (check of power supply necessary)
Power supply voltage, low voltage error	150ms 1200ms ON OFF 150ms 150ms	Recovery impossible (check of power supply necessary)
Head thermistor error	150ms 900ms ON OFF 150ms 300ms 150ms	Recovery impossible

Table 1.12

Error name	Flickering pattern	Recovery condition
Internal data processing error	150ms ON OFF 150ms 1950ms	Recovery made by turning ON the power supply again.
No head paper error	150ms ON OFF 150ms 1650ms	Recovery made by inserting paper and then closing the cover.
Head overheat error	150ms ON OFF 150ms 1350ms	Recovery made automatically by cooling down the head.
Auto cutter error	150ms ON OFF 150ms 2250ms	Recovery made by turning OFF the power supply, then removing the jammed paper, and turning ON the power again.

Table 1.12 (*Continued*)

Display of wait status set by macro execution command

Status	Flickering pattern	Recovery condition
Macro execution wait status	300ms ON OFF 300ms	Recovery can be made by starting the execution of macro by pressing the paper feed switch.
Test printing wait status	1.2s ON OFF 1.2s	Recovery can be made by restarting of the printing by pressing the paper feed switch.

Table 1.13

The specified definition range can be executed any number of times, using the macro execution command. Whether to execute the macro continuously or execute it with paper feed button can be selected at that time. When executing with paper feed button, the error LED flickers to indicate execution wait status.

1.2.8 Self Test

The following points can be checked with self test function.

- Control circuit functions
- Printer mechanism functions
- Print quality
- Version of control ROM

Execution of Self Test

One of the following 2 cases is executed by ROM.

Case 1:

If the power supply is turned ON while holding the paper feed button pressed, *printer status printing and test printing are done. After a fixed number of lines have been printed, "***completed***" is printed out, the printing ends, and regular mode is restored.

Case 2:

If the power supply is turned ON while holding the paper feed button pressed, *printer status printing is done. At the end of the printing, error LED starts flickering, test print wait status sets in, and test printing is started as soon as the paper feed button is pressed. After a fixed number of lines have been printed, "***completed***" is printed out, the printing ends, and regular mode is restored.

Notes:

- Self test cannot be executed while the printer cover is open or while there is no roll paper.
- The printing of self test can be temporarily halted by pressing the paper feed switch. And, the printing is resumed by pressing the paper feed switch again. (Error LED remains ON while the printing is halted).

*Printer status printing includes the following:

- Version
- Dip switch status which is set
- Self test printing pattern

1.2.9 Receiving Buffer

1) Serial interface specification

Either 4K bytes or 45 bytes can be selected with the DIP switch.

2) Parallel interface specification

Either 4K bytes or 0 bytes can be selected with the DIP switch.

1.2.10 Environment Specifications

Temperature

While operating	: 5°C ~ 40°C
In storage	: -10°C ~ 50°C (excluding paper)

Humidity

While operating	: 30% ~ 85% (no condensation)
In storage	: 30% ~ 90% (no condensation) (excluding paper)

Shock resistance

Unpacked	: Shall suffer no damage when dropped from a height of 5cm, holding.
In package	: Shall suffer no damage when dropped from a height of 60cm (6 surfaces, 1 angle, 3 edges), while in CASIO standard package.

Vibration resistance

Frequency	: 5 ~ 55Hz
Acceleration	: 2G
Sweep Time	: 10 min. : 1 hour

Shall suffer no damage in appearance, interior, and cause no problems in operations, when subject to vibrations in XYZ directions, while in packaged condition.

Noise

While operating : ANSI Standard

<T60 series> 50dB or lesser (in Bystander position)

<T80 series> 55dB or lesser (in Bystander position)

1.2.11 Reliability Specifications

MCBF : 3.5 Million lines (font A printing)

1.2.12 EMI Standard

FCC : class A

VCCI : #1

FTZ : class B

1.2.13 Electrostatic Resistance

No malfunctions should occur under 8kV conditions (at room temperature and humidity).

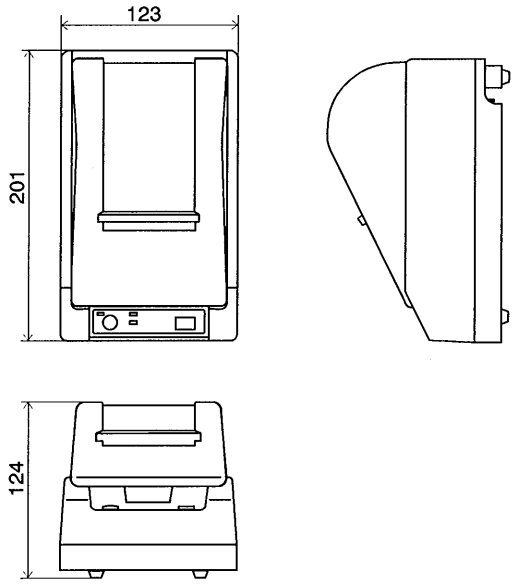
1.2.14 Case Specifications

Item		TM-T60 series	TM-T80 series	
			Without auto cutter	With auto cutter
Color		CASIO standard gray	CASIO standard gray	CASIO standard gray
Outer dimensions	Height	124mm	125mm	125mm
	Width	123mm	145mm	145mm
	Depth	201mm	216mm	216mm
Weight		About 0.8kg	About 1kg	About 1.3kg

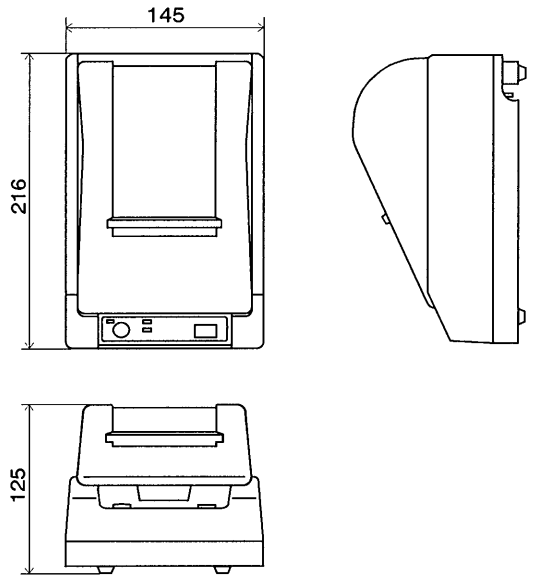
Table 1.14

Outer dimension diagrams (unit : mm)

<TM-T60 series>



<TM-T80 series (without auto cutter)>



<TM-T80 series (with auto cutter)>

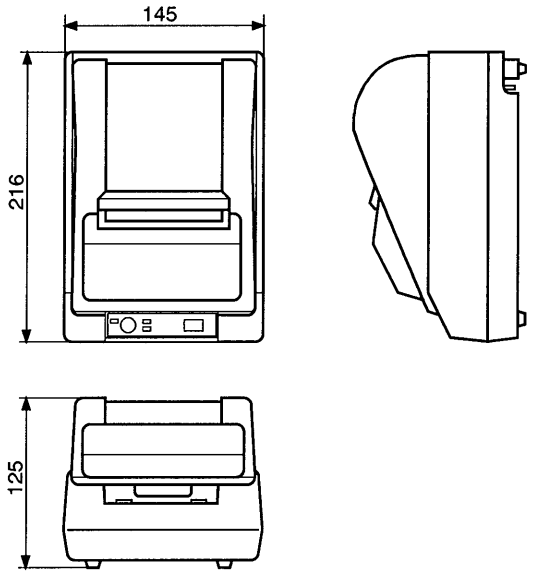


Figure 1.10

1.2.15 Option (Auto Cutter)

※ Available for TM-T80 series only

Cutter motor

Voltage : 24V DC±10%
Average current : About 0.5A (24VDC, 25°C, excluding starting
Peak current : About 2A (24VDC, 25°C, at reversing) 3A or lesser (worst case)

Detector

Mode : Mechanical contact
Rated voltage : 5VDC±5%
Rated current : 0.1mA to 0.5mA

Connecting method

Mode : Pin connector type
Model : 5102-05 (MOLEX)

Reliability

MCBF : 300,000 cuts (including full and partial cuts)

Weight : About 400g

– MEMO –

CHAPTER 2

OUTLINE AND OPERATING PRINCIPLE

CONTENTS

2.1 OUTLINE 2-1
2.1.1 Hardware 2-1
2.1.2 Product Blocks 2-1
2.1.3 CPU Port Allocation 2-2
2.1.4 Gate Array Port Allocation 2-2
2.2 ELECTRICAL CIRCUITS OPERATION 2-2
2.2.1 Electrical Circuits 2-2
2.2.2 Head Control Circuit 2-3

2.1 OUTLINE

2.1.1 Hardware

1) Serial interface specifications

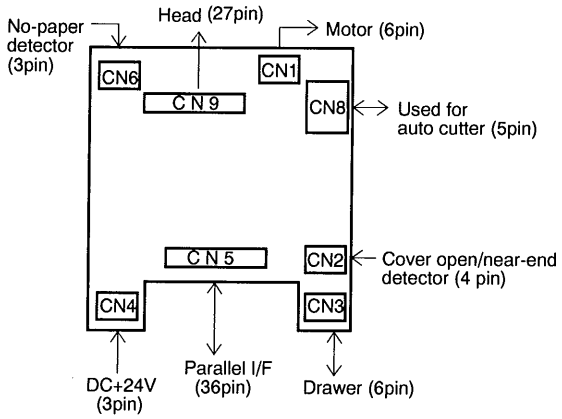


Figure 2.1

2) Parallel interface specifications

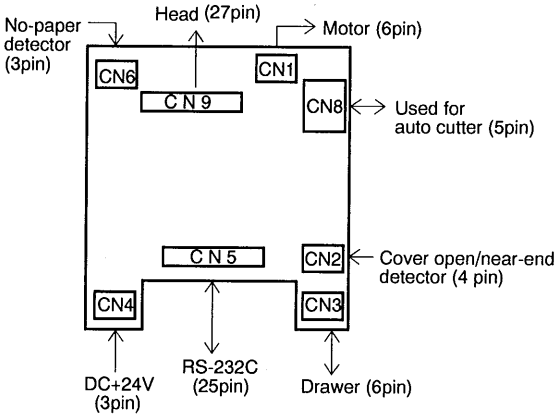


Figure 2.2

2.1.2 Product Blocks

1) Serial interface specifications

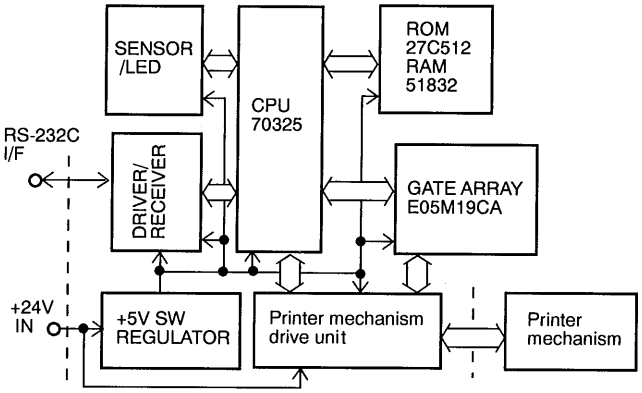


Figure 2.3

Main circuit board is composed of the following components

- CPU μPD70325
- EPROM 512K bit (Kanji version : 4M bit)
- RAM TC51832
- Gate array E05M19CA
- Head control circuit
- Motor control circuit
- Detector circuit
- Communication circuit
- Display circuit

2) Parallel interface specifications

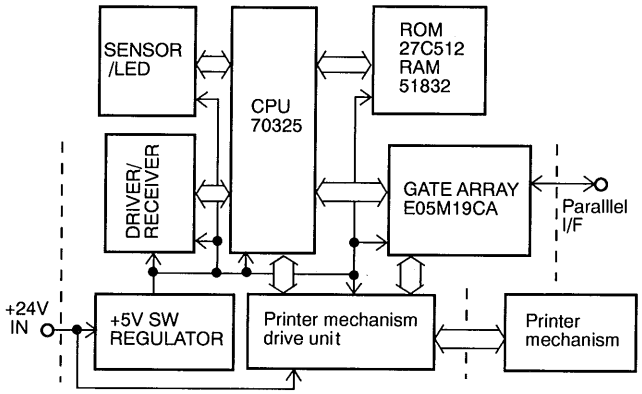


Figure 2.4

Main circuit board is composed of the following components

- CPU μPD70325
- EPROM 512K bit (kanji version : 4M bit)
- RAM TC51832
- Gate array E05M19CA
- Head control circuit
- Motor control circuit
- Detector circuit
- Communication circuit
- Display circuit

2.1.3 CPU Port Allocation

Port Name	Pin No.	I/O	Function
P00	64	O	STEPPING MOTOR SIGNAL
P01	65	O	
P02	66	O	STEPPING MOTOR COMMON
P03	67	O	+21 ON/OFF FET CONTROL
P04	68	O	ERROR LED
P05	71	O	NOT USED
P06	72	O	NOT USED
P07	73	O	RS-232C DTR
$\overline{INP0}$	31	I	GATE ARRAY SITUATION
$\overline{INP1}$	32	I	NOT USED
$\overline{INP2}$	33	I	NOT USED
P14	34	I	PAPER FEED SW
P15	35	I	COVER OPEN SW
P16	36	I	NOT USED
P17	37	I	NEAR END SW
DMARQO	17	I	GATE ARRAY COMMUNICATION
$\overline{DMAAKO}$	21	O	
$\overline{TCO}$	23	O	
DMARQI	25	I	
$\overline{DMAAKI}$	26	O	
$\overline{TC1}$	27	O	
PT0	38	I	THERMISTER DETECT
PT1	39	I	HEAD RANK DETECT
PT2	40	I	HEAD VOLT DETECT
PT3	41	I	PAPER END SW
PT4	42	I	TRANSISTER SHORT DETECT
PT5	43	I	NOT USED
PT6	45	I	JP T60/T80
PT7	46	I	NOT USED

Table 2.1

2.1.4 Gate Array Port Allocation

Port Name	Pin No.	I/O	Function
CEN7	25	I	DIP SW 3
CEN6	26	I	DIP SW 4
CEN5	27	I	DIP SW 5
CEN4	28	I	DIP SW 6
CEN3	29	I	DIP SW 7
CEN2	30	I	NON USED
CEN1	31	I	NOT USED
CEN0	32	I	NOT USED
IO10	16	I	DIP SW 1
IO11	17	I	DIP SW 2
IO12	18	I	DIP SW 8
IO13	19	I	DIP SW 9
IO14	20	I	DIP SW 10
IO15	21	I	DRAWER KICK SW
IO16	22	I	RS-232C DSR
IO17	23	I	NOT USEDD
BE7	2	O	HEAD DRIVER LATCH
BE6	1	O	HEAD DRIVER BLOCK1 ENABLE
BE5	80	O	HEAD DRIVER BLOCK2 ENABLE
BE4	79	O	HEAD DRIVER BLOCK3 ENABLE
BE3	78	O	HEAD DRIVER BLOCK4 ENABLE
BE2	77	O	NOT USED
BE1	76	O	DRAWER KICK 2 DRIVE
BE0	75	O	DRAWER KICK 1 DRIVE
$\overline{STRBN}$	36	I	NOT USED
BUSY	37	O	NOT USED
$\overline{ACKN}$	24	O	NOT USED
SI	72	O	HEAD DATA
SCLK	74	O	HEAD DATA OUTPUT CLOCK
IO40	3	O	NOT USED
IO41	4	O	NOT USED
IO42	5	O	NOT USED
IO43	6	O	STEPPING MOTOR DRIVE OFF
IO44	7	O	NOT USED
$\overline{DMATRM}$	39	O	GATE ARRAY SITUATION
$\overline{INT1}$	38	O	NOT USED
DMARQON	45	O	CPU COMMUNICATION
$\overline{DMAAKON}$	44	I	
$\overline{TCO}$	43	I	
DMARQIN	42	O	
$\overline{DMAAKIN}$	41	I	
$\overline{TC1}$	40	I	

Table 2.2

2.2 ELECTRICAL CIRCUITS OPERATION

2.2.1 Electrical Circuits

- By connecting DC +24V power supply to CN4, DC +24V is supplied from fuse F1 (6.3A) to power circuit, via noise filter L1.

- When the power switch SW1 is turned ON, DC +24V is input into regulator REG1, via fuse F2 (1A); and +5V is output from it. As a result, the logic circuit of main substrate is built up, and the power LED (LED3) (green) lights. If LED3 does not light, the fuse F1 or F2 is most likely blown off.
- At the time of printing or paper feeding, after the logic circuit has built up normally, pin 67 of CPU turns High, Q3 turns ON, causing Q2 to turn ON and supply +24V to the head and motor. While the printer is waiting, pin 67 of CPU turns Low, and +24V is no more supplied to the head and motor.

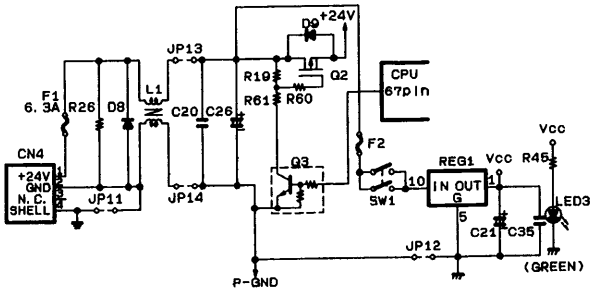


Figure 2.5

- If +24V is not supplied after the head and motor have attained drive status, it may be due to one of the following possible faults. At first, the logic circuit may not be normally built up. In this case CPU (UA1), ROM (UA2), RAM (UB1), gate array (UC1), or the element of reset IC (UB2) may be faulty or improperly mounted. Secondly, the transistors (Q2, Q3) which supply +24V or resistances (R19, R60, R61) may be faulty.
- Input voltage is then detected at pin 40 of CPU; and if it found to be higher or lower than the prescribed range, it is displayed as an error, without any operation taking place.

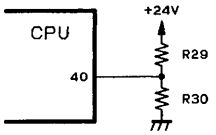


Figure 2.6

2.2.2 Head Control Circuit

- The head driver, which is composed of a shift transistor, latch, and transistors, is mounted on a head chip. Each head driver has 64-bit output, and two head drivers (128 bits) are charged as one block. Therefore, in T60 series, 3 blocks (384 bits, BE1 to BE3) are charged; and in T80 series, 4 blocks (512 bits, BE1 to BE4).

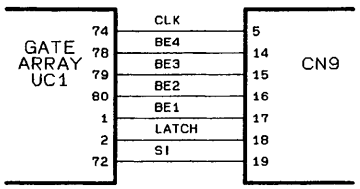


Figure 2.7

- As data is input into gate array (UC1) from the data bus, it is synchronized with CLK, then output from SI terminal as serial data, and finally transferred to the shift register of the head driver located next to CN9. Once a series of data is transferred in this way, it is preserved in the latch of the head driver by a LATCH signal. The corresponding block is then charged for as long as BE1 to BE4 remain High.

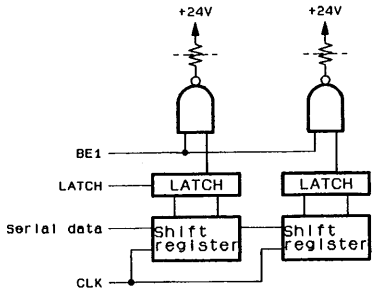


Figure 2.8

- A thermistor is mounted into the head. The voltage is divided by a resistance, and the temperature of the head is monitored by detecting it at pin 38 of CPU.

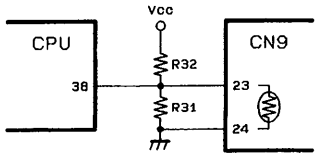


Figure 2.9

2.2.3 Step Motor Drive Circuit

- The step motor is driven by 2-2 phase excitation, with the phase A output by CPU pin 64 and phase B output by CPU pin 65. At UB4, the signals of phases $\overline{A}$ and $\overline{B}$ are prepared, which then drive the phases A, B, $\overline{A}$, $\overline{B}$ that are linked to CN1 by the transistor array UE1.
- At the time of retaining the step motor, CPU pin 66 is turned to High, transistor Q7 is turned OFF, whereby +5V is supplied from Vcc to COMMON 3, 4 of CN1.
- At the time of paper insertion, the excitation of step motor is cut off by stopping the current from flowing to the BASE of transistor array UE1 via the resistance array RM2, by turning pin 6 of gate array to High.

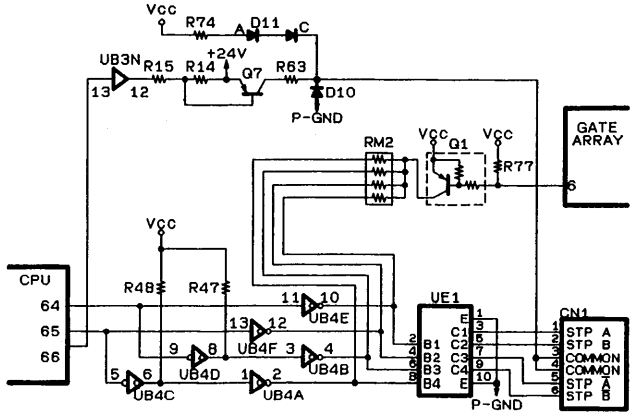


Figure 2.10

2.2.4 Drawer-Kick Drive Circuit

- The plunger of drawerkick is driven by L1(–), L2(–) of CN3 by turning transistors Q6, Q5 ON, as a result of turning the pins 75, 76 of gate array to High. The status can be sent back to the host computer by detecting the SW (+) of drawer-kick open/close switch CN3 with gate array pin 21.
- The short status of transistors Q5, Q6 is detected by reading the voltage of COLLECTOR at CPU 42pin. The voltage is pulled up with R22, via diodes D1, D2. If it is found to be short status, an error is displayed. This may be due to faulty transistors Q5, Q6.

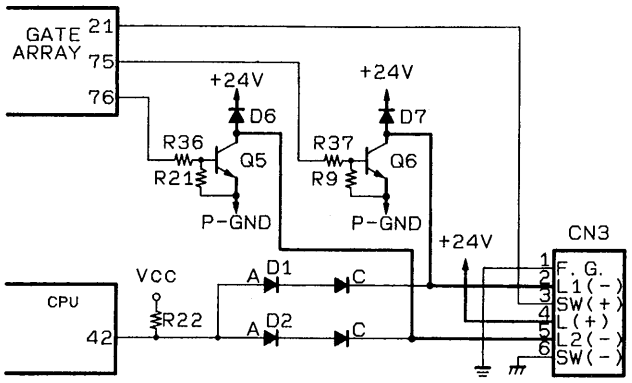


Figure 2.11

Note:

The drawerkick cannot be used, when the drawerkick connector is covered (in this case, Q5, Q6 are not mounted).

2.2.5 Reset Circuit

- When the power supply is turned ON, the voltage of Vcc rises; and as soon as it reaches 4.5V, pin 3 of UB2 changes over to High. As a result, current flows to C5 via R1, gently raising its voltage. As soon as it exceeds the threshold voltage of pin 34 of gate array, pin 71 of the gate array turns High, and since the reset terminal pin 57 of CPU turns High, the system is actuated.
- This reset time is determined by the time constants of R1, C5 and the threshold voltage of pin 34 of the gate array.

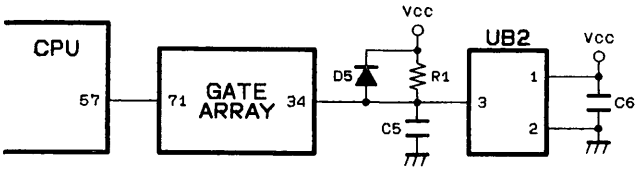


Figure 2.12

2.2.6 Auto Cutter Drive Circuit (Installed With Auto Cutter)

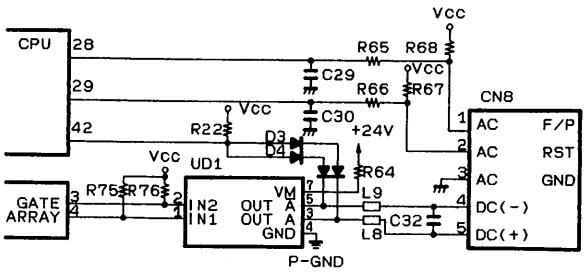


Figure 2.13

- Pins 3, 5 are driven by turning pins 1, 2 of UD1 to High, Low respectively; and as a result the DC motor of the auto cutter is driven via pins 5, 4. Various combinations of High and Low achieve forward run, reverse run, braking, and halting of the motor.
- The cutter blade position signal is output from pins 1, 2 of CN8, and it is detected at pins 28, 29 of CPU.
- The short status of pins 3, 5 of UD1 is detected at pins 42 of CPU; and in case of short status, an error is displayed.

2.2.7 Other Circuits

Other interfaces, detection circuits, and DIP switches are identical to the specification.

2.3 PRINTER MECHANISM OPERATION

2.3.1 Power Transmission Mechanism

The printer mechanism is composed of a motor gear and 1st and 2nd deceleration gears that are mounted on the motor shaft, and the platen gear that is mounted on the platen shaft. All of them are installed on a frame.The power source of this printer is a compact and high performance stepping motor; and its power is transmitted to the platen gear, after being decelerated by the 1st and 2nd deceleration gears respectively. The arrows in the following diagram show the rotating directions of the gears.

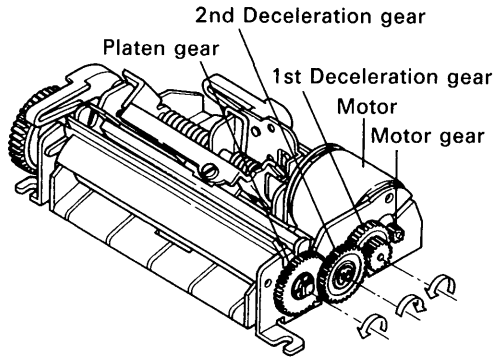


Figure 2.14

2.3.2 Paper Feed Mechanism

This mechanism is composed of a paper-feed knob that is mounted on the platen shaft, and a thermal head which functions as a print mechanism. Paper is fed out when the platen turns in the direction of the arrow A through a series of gears, after the motor runs clockwise as seen from the direction of its shaft.

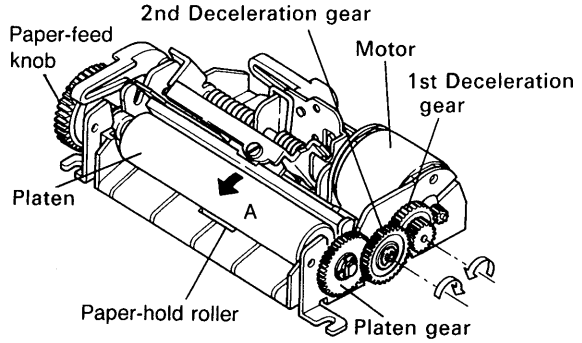


Figure 2.15

- **Paper feed operation while printing**
  The platen is pressed with uniform pressure, through the thermal paper, by the paper-hold roller and thermal head. The rotation of the platen in the direction of the arrow A causes the thermal sheet to be fed out in the direction of the arrow B.

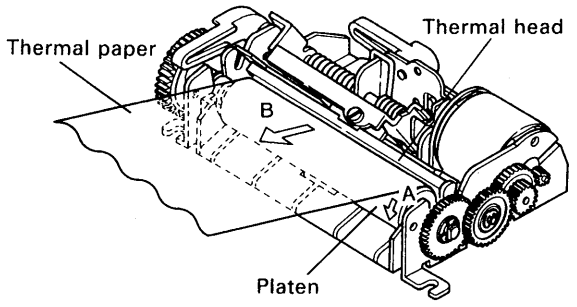


Figure 2.16

- **Manual paper feeding while not printing**
  Lifting up of the release lever separates the thermal head from the platen, causing only the paper-hold roller to press against the platen with uniform pressure, through the thermal paper. Therefore, when the paper-feed knob is turned, the thermal sheet is freely fed out in the direction of the arrow C (See Figure 2.17)

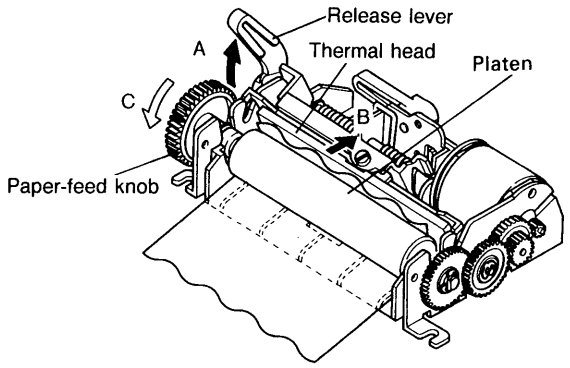


Figure 2.17

2.3.3 Print Mechanism

This mechanism is composed of a print mechanism and head open mechanism.

1. Print mechanism

This mechanism is composed of a thermal head (with Dr IC for controlling the charging of heating units) containing several heating units arranged linearly, and a platen (serving as paper feed mechanism also).

- **Principle of print operation**
  Figure 2.18 shows the construction of the cross section of thermal head and thermal paper and printing is done according to the following steps.

① The electrodes of each corresponding dot are charged by a print signal, with a pulse of uniform charging width.

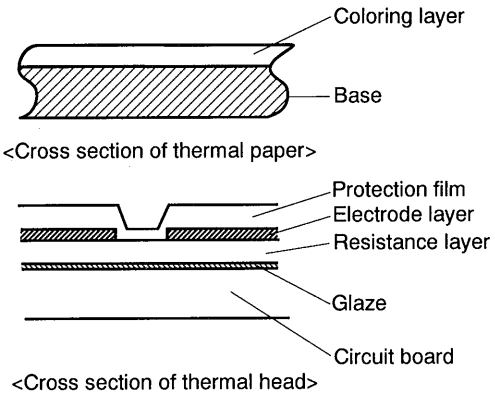


Figure 2.18

② Inside the thermal head, as seen in Figure 2.18, a resistance layer is formed at the bottom of each electrode; so when the electrode is charged the resistance layer gets heated up.

③ The thermal energy of the heated up resistance layer is transmitted to the thermal coloration layer on the surface of thermal paper, via the protective film of the thermal head; and the resultant coloring of the coloration layer of the thermal paper forms the print characters.

2. Head open mechanism

- This mechanism is used to remove the jammed paper from the printer, and to clean the thermal head. It is composed of a head pressurizing panel onto which the thermal head is mounted, an auxiliary lever that supports and enables the head open lever to rotate, a head pressurizing panel shaft that supports both the head pressurizing panel and auxiliary lever, and a head pressurizing spring that pressurizes the thermal head with uniform pressure.
- At the fixed position of head open lever, usually the auxiliary lever remains fixed at its prescribed position. Therefore, the thermal head is held pressed against the platen, via the head pressurizing panel, by means of the spring load of head pressurizing spring, making printing possible.
- When the head open lever is turned in the direction of the arrow C, the support of the auxiliary lever is released, causing the auxiliary lever and the head pressurizing panel carrying the thermal head to rotate, centered on the shaft of the head pressurizing panel, which results in a head open state wherein the close contact between the platen and thermal head is released.

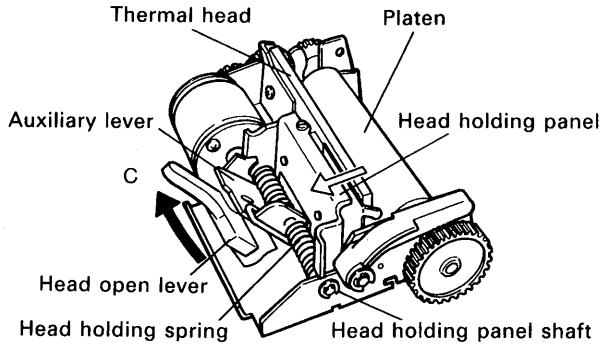


Figure 2.19

2.3.4 Detection Mechanism

No paper detecting machanism

The no paper detecting machanism is located inside the paper guide in the vicinity of thermal head to detect the end of thermal paper. It employs a reflecting type sensor that is composed of LED and photo transistor.

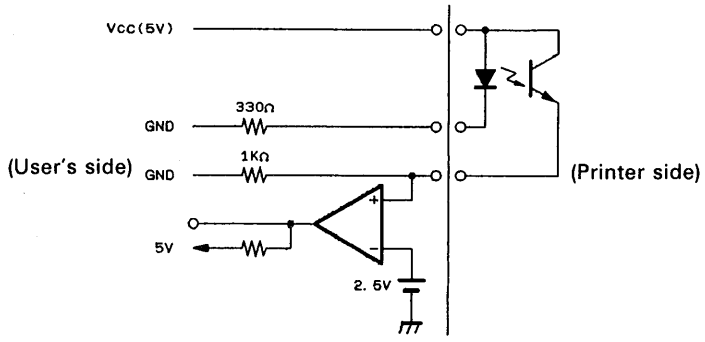


Figure 2.20

As the end of thermal paper crosses inside the paper guide, the amount of light reaching from the LED to the photo transistor changes (because of different reflection ratio), causing a change in the output level of photo transistor (see Figure 2.21), thereby enabling detection of no thermal paper.

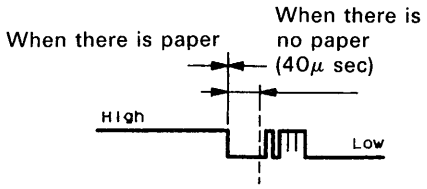


Figure 2.21

2.3.5 Auto Cutter Mechanism (Option)

This mechanism is composed of transmission, detection, and cutter mechanisms. Its outer view is as shown in Figure 2.22. It can be mounted on the TM-T80 series only.

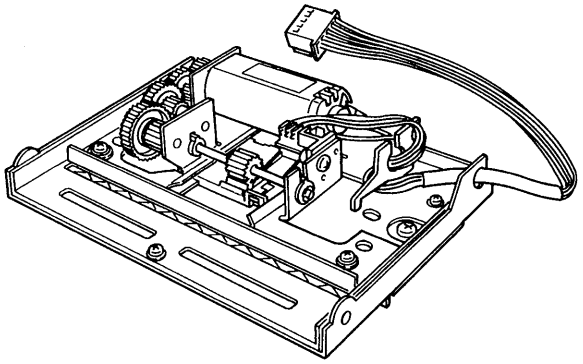


Figure 2.22

Transmission mechanism

This mechanism is composed of a motor gear, 2 deceleration gears A, and a deceleration gear B which are press-fitted onto the motor shaft, 2 drive gears which are press-fitted onto the drive gear shaft, and a slider ass'y. It is as shown in Figure 2.23.

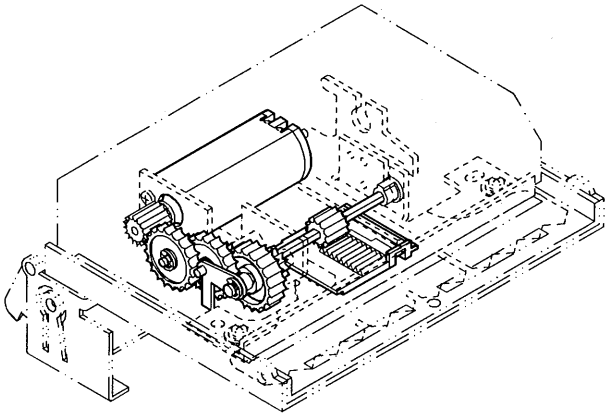


Figure 2.23 Transmission mechanism

The motor rotation is transmitted from the motor gear to the drive shaft, after being decelerated successively by the deceleration gears A and deceleration gear B. The rotation energy that is decelerated and transmitted by the gears is converted into sliding operation, by the operations of the drive gear that is press-fitted onto the drive shaft and the teeth of slider ass'y, causing the slider ass'y to slide along directions.

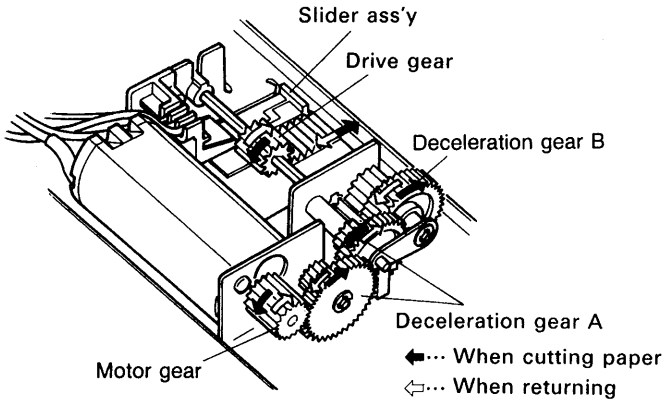


Figure 2.24 Transmission operation

Detection mechanism

This mechanism is a detector which employs a contact method. It is composed of a slider ass'y and a contact holder sub-set, and it detects the sliding state (amount of travel) of the slider ass'y. It (portion enclosed in solid lines) is as shown in Figure 2.25.

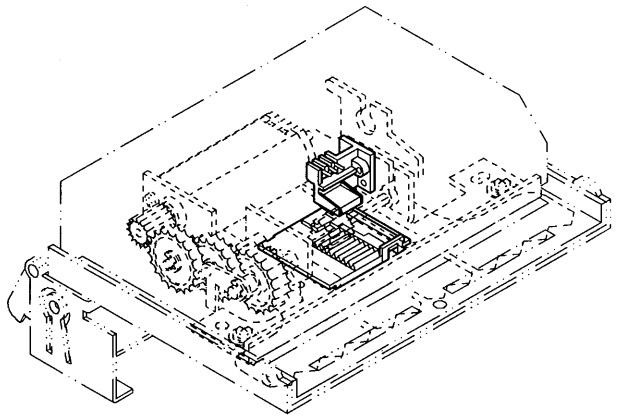


Figure 2.25 Detection mechanism

As seen in Figure 2.26, there are 3 contacts (GND terminal, reset signal terminal, and *F/P position signal terminal) in the contact holder sub-ass'y. Each of the contacts is grounded onto the print pattern of the detection circuit board that is mounted on the slider ass'y (see Figure 2.27). Reset and *F/P position signals are generated by the slider ass'y, as a result of the slide created by the drive gear.

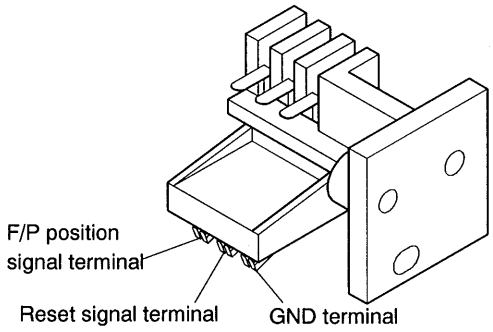


Figure 2.26 Contact holder sub-set

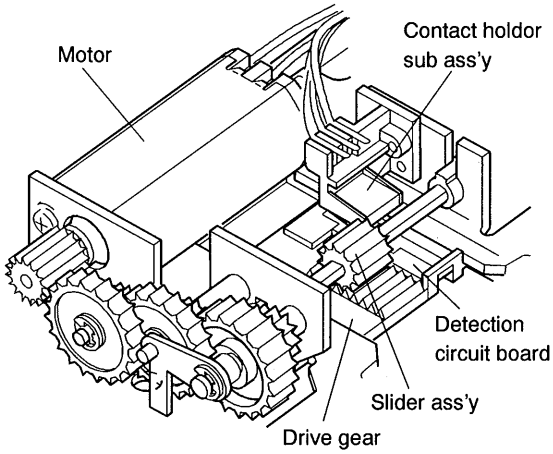


Figure 2.27 Joint between the contacts and detection circuit board

F/P Position stands for full cut/partial cut position.

Cutter mechanism

This mechanism is composed of a cutter head, cutter blade, and cutter unit desk ass'y. It operates in two ways: full cut and partial cut according to the F/P position signal generated from the detection mechanism. Figure 2.28 shows this mechanism.

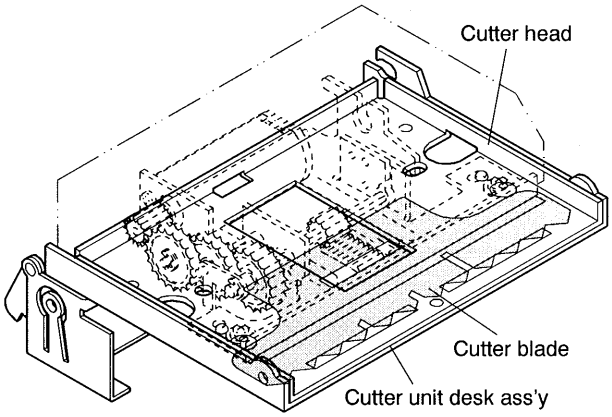


Figure 2.28 Cutter mechanism

<Cutter operation>

The motor is charged from home position (state in which the cutter blade is not protruding outside the cutter head and the slit of cutter unit desk ass'y (reset signal High level)); and as the motor runs counterclockwise, the drive gear that is set on the teeth of slider ass'y is also rotated counterclockwise, via the transmission mechanism (series of gears), causing the slider ass'y to move in the direction of the cutter head and the slit of cutter unit desk ass'y (direction of Figure 2.29).

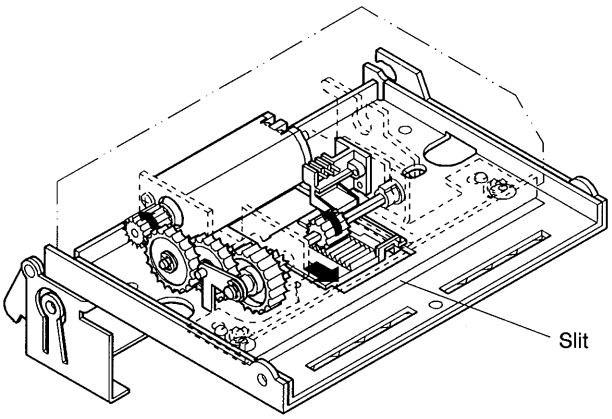


Figure 2.29 Operation of cutter blade

Since the protruding part on the reverse of slider ass'y is engaged into the rectangular hole of the cutter blade, the cutter blade synchronizes with the movement of the slider ass'y and cuts the paper that is set on the slit (see Figure 2.29). After cutting, the cutter blade is restored to its original position (home position) by reversing the charging polarity of the motor, which causes the motor to run reverse (clockwise).

<Full cut operation>

As the motor is charged while at home position and as the slider ass'y starts sliding, the reset signal changes from High to Low level, but the F/P position signal keeps its High. Next, as the slider ass'y is further slides by continuously charging the motor (that is, when paper cutting begins), the F/P position signal changes to Low. As soon as it once again changes over to High, the charging of motor is cut off, causing the slider ass'y to halt sliding (end of paper cutting).

At the end of paper cutting, the charging polarity of motor is inverted, causing the motor to run reverse (clockwise), whereby the cutter blade is restored to its original position (home position), completing the paper cutting operation.

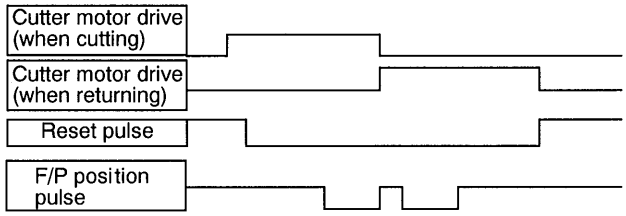


Figure 2.30 Timing chart of full cut operation

<Partial cut operation>

As the motor is charged while at home position and as the slider ass'y starts sliding, the reset signal changes from High to Low level, but the F/P position signal keeps its High. Next, as the slider ass'y is further made slides by continuously charging the motor (that is, when paper cutting begins), the F/P position signal changes to Low. As soon as it changes to Low, the charging of the motor is cut off, causing the slider ass'y to halt sliding (end of paper cutting).

At the end of paper cutting, the charging polarity of the motor is inverted, causing the motor to run reverse (clockwise), whereby the cutter blade is restored to its original position (home position), completing the paper cutting operation.

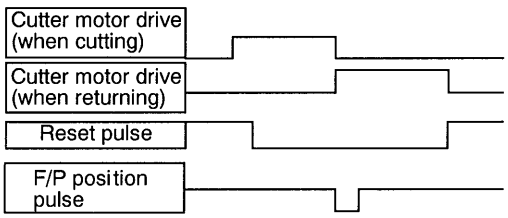


Figure 2.31 Timing chart of partial cut operation

CHAPTER 3

DISASSEMBLY, ASSEMBLY AND ADJUSTMENTS

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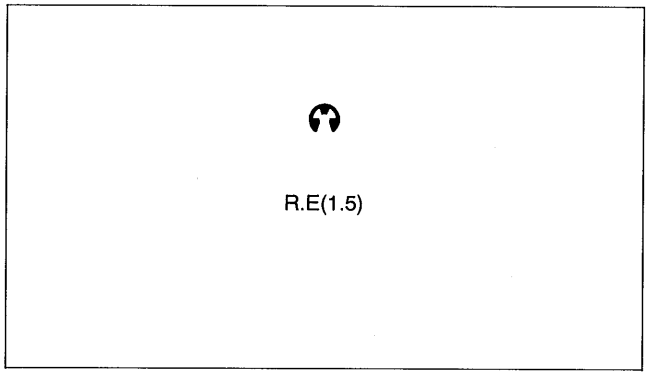
3.1 OUTLINE

- This section describes the disassembly, assembly, and adjustments of the TM-T60/T80 series. The disassembly and assembly in unit level is presented successively. Disassembly and assembly in ass'y level is also taken up in the corresponding items of unit level.
- All minor parts are indicated with their abbreviations.

Table of abbreviations

C.B	: Cross – recessed Binding head screw
C.B.S-tite	: Cross – recessed Binding head S tite self tapping screw
C.B.T-B	: Cross – recessed Binding head self Tapping screw without fluted class 2
C.C	: Cross – recessed Cup head screw
C.P	: Cross – recessed Pan head screw
C.P.(O)	: Cross – recessed Pan head screw Outside tooth type B
C.P.S-tite	: Cross – recessed Pan head S tite self tapping screw
C.P.T-B	: Cross – recessed Pan head self Tapping screw without fluted class 2
C.P.T-BT	: Cross – recessed Pan head self Tapping screw with flated class 2
H.L	: Hexagon Lock screw
O.W	: Outside tooth type-B

Actual-Size Diagrams of Small Parts



3.2 DISASSEMBLY OF COMPLETED UNIT

- Disassembly is basically done in the opposite order of section 3.3 "Assembly".
- Be sure not to disassemble beyond the comprehensive disassembly diagram in Capter 6 "Appendix", or the function may be disrupted.
- Check the following items before disassembly.
  - Disconnect the power cable.
  - Remove the printing paper from the printer.

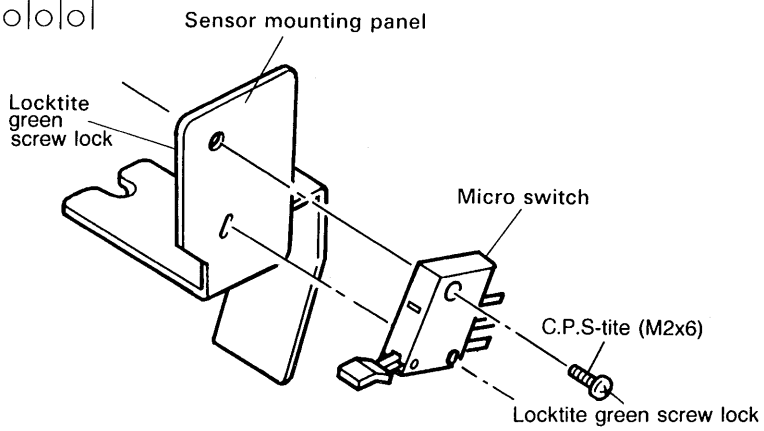
3.3 ASSEMBLY OF COMPLETED UNIT

- Assembly is divided into a main assembly and a sub assembly. At first, make the sub assembly, and then proceed to make the main assembly.
- Assemble while checking the shape and mounting position of parts in the comprehensive disassembly diagram in Chapter 6 "Appendix".
- A circle around the number in the Assembly order column indicates that lubrication is required before the part is installed. Applying the lubricant would be difficult once it assembled completely.
- Details about lubrication and adhesion are given in section 5.2.3. Also refer to the comprehensive disassembly diagram given in Chapter 6 "Appendix".
- The "S", "P", "M", "A" appearing in the Device column stand for the following versions.
  S ... Serial version
  P ... Parallel version
  M ... Kanji version
  A ... Version with auto cutter
- The parts marked " ◌ " indicate that either one of them, which suits the existing conditions, may be used as the assembly part marked " ◌ " in the Device column
- ◎ mark in the Device column indicates that the part is optional.

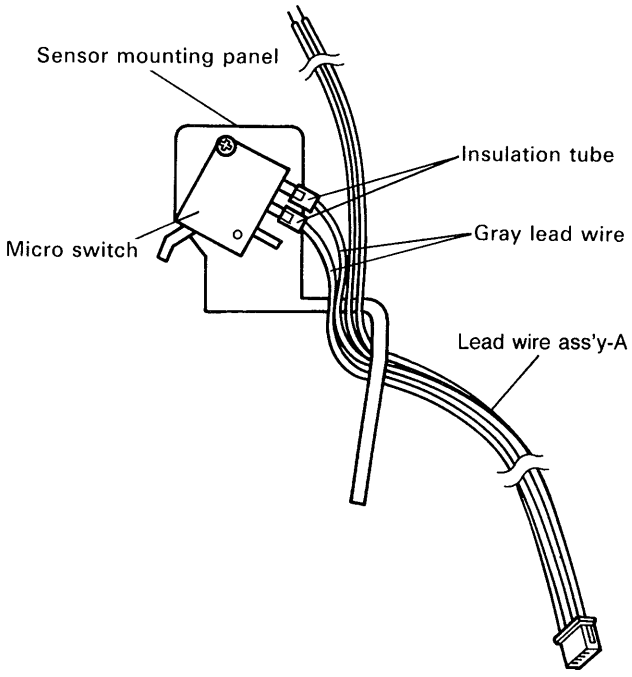
3.3.1 Sub Assemblies

Sub-Assembly A Cover Sensor Ass'y-A

Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
①	Sensor mounting panel	○	○	○	○	○	○	● Set the micro switch on sensor mounting panel, and fasten it with C.P.S-tite.
2	Micro switch	○	○	○	○	○	○	
	C.P.S-tite (M2×6) ×1	○	○	○	○	○	○	

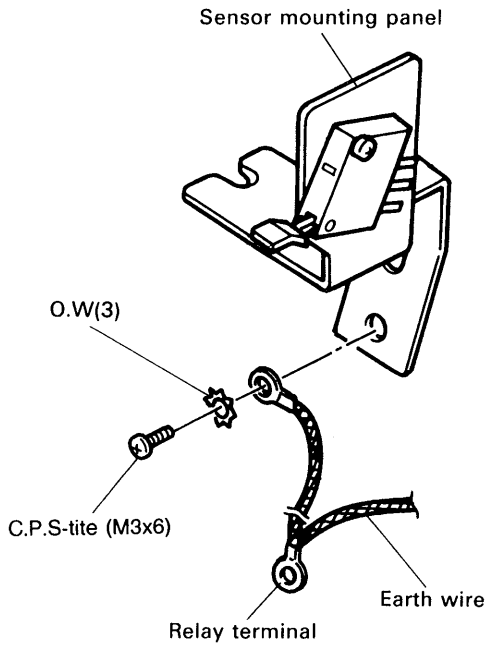


								● Coat Locktite Green screw lock on C.P.S-tite and sensor mounting panel.
3	Lead wire ass'y-A	○	○	○	○	○	○	● Fix the insulation tubes on the gray lead wires of lead wire ass'y-A, and then solder them on the terminal of micro switch.
4	Insulation tube (ø1.5) ×2	○	○	○	○	○	○	● Next, set the insulation tubes at the soldered point, and then compress them by heating with a dryer (industrial purpose).

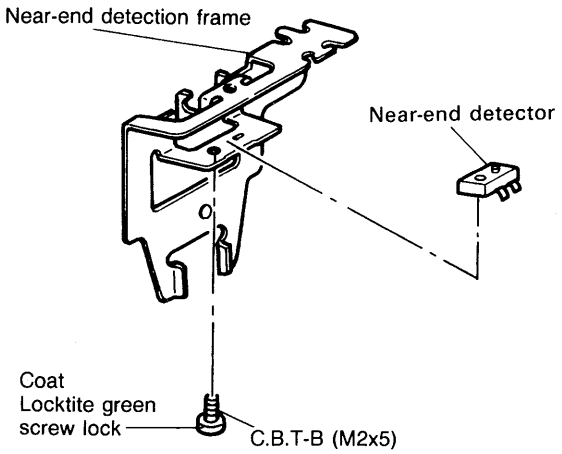
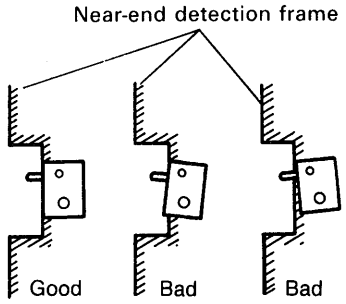
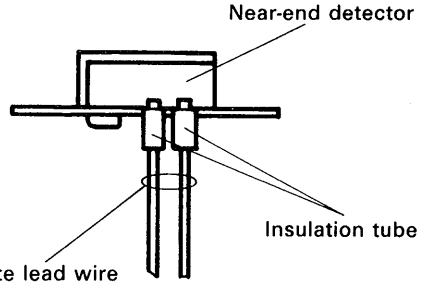


Sub-Assembly A

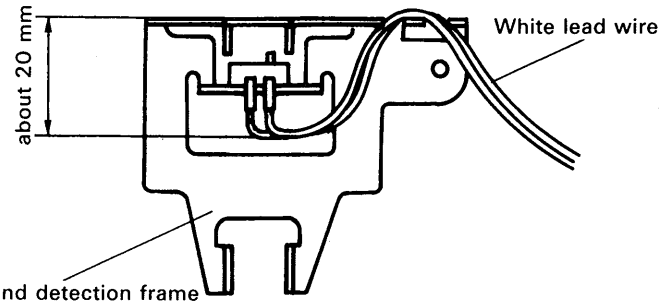
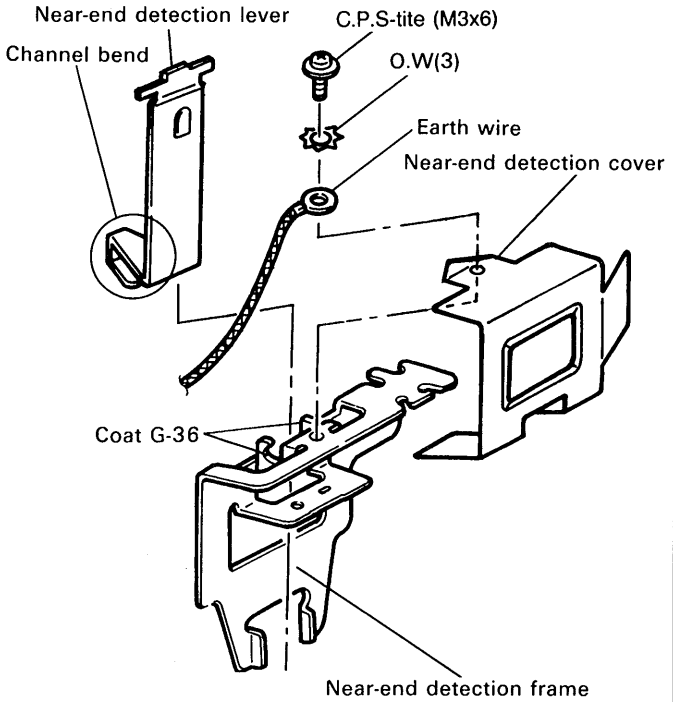
Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
5	Earth wire	○	○	○	○	○	○	● Taking the crimping points (relay terminals) of 2 earth wires as a starting point, set the naked crimp terminal of shorter earth wire onto the sensor mounting panel, and then fasten it with C.P.S-tite.
	C.P.S-tite (M3×6) ×1	○	○	○	○	○	○	
	O.W(3) ×1	○	○	○	○	○	○	



Sub-Assembly B Near-end Detection Frame Ass'y-A

Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
①	Near-end detection frame	○	○	○	○	○	○	● Set the near-end detector onto the near-end detection frame.
2	Near-end detector	○	○	○	○	○	○	
	C.B.T-B (M2×5) ×1	○	○	○	○	○	○	● Holding the near-end detector stationary with fingers, fasten it with C.B.T-B. ● Apply Locktite green screw lock on and around the head of C.B.T-B.  **Note :** When assembling the near-end detector with C.B.T-B, make sure that it does not become inclined as shown in the following diagram. 
3	Insulation tube (ø1.5) ×2	○	○	○	○	○	○	● Fix the insulation tubes on the white lead wires of lead wire ass'y-A, and solder the wires onto the terminal of near-end detector. ● Next, set the insulation tubes at the soldered point, and then compress the insulation tubes by heating them with a dryer (industrial purpose). 

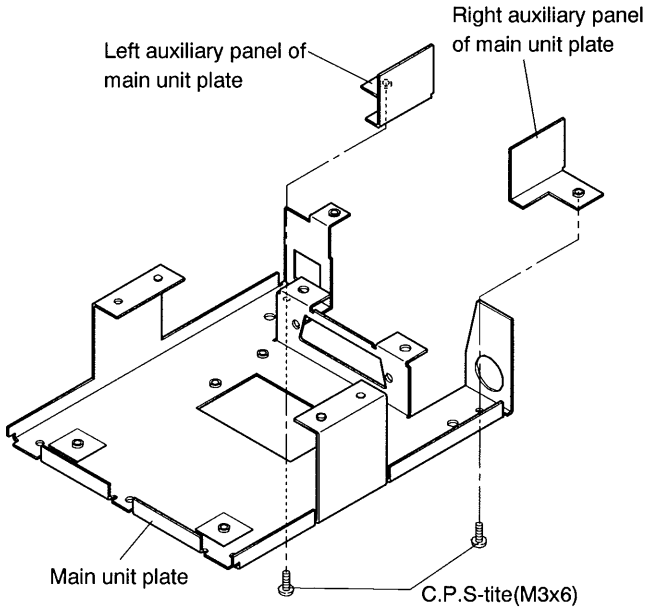
Sub-Assembly B

Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
								● Pass the 2 white lead wires through the near-end detection frame and process them as shown in the following diagram.
								
								Note : Make sure to slack off the white lead wires as shown in the above diagram.
④	Near-end detection lever	○	○	○	○	○	○	● Set the near-end detection lever onto the near-end detection frame in such a way that the channel shaped bent portion of the near-end detection lever falls on the opposite side of near-end detector.
5	Near-end detection cover	○	○	○	○	○	○	● Set the near-end detection cover on the near-end detection frame, set the naked crimp terminal of earth wire (longer one, taking the relay terminal as the starting point) at the retaining screw of near-end detection cover, and then fasten both of them with C.P.S-tite.
	C.P.S-tite (M3×6) ×1	○	○	○	○	○	○	
	O.W (3) ×1	○	○	○	○	○	○	
								● Apply G-36 to the contact points of near-end detection frame and near-end detection lever.

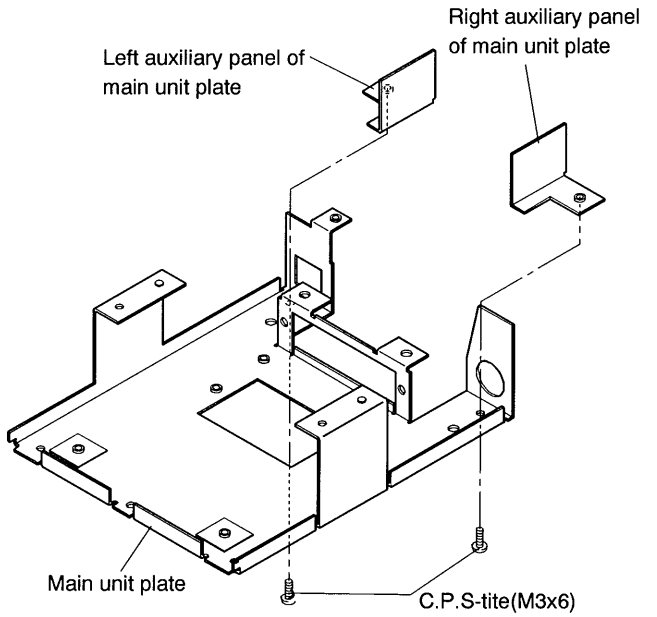
Sub-Assembly C Main Unit Plate Ass'y

Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
1	Main unit plate			○	○	○	○	● Align the dowels of left and right auxiliary panels of the main unit plate against the holes of main unit plate, and fasten them with C.P.S-tite.
2	Right auxiliary panel of main unit plate			○	○	○	○	
3	Left auxiliary panel of main unit plate			○	○	○	○	
	C.P.S-tite (M3×6) ×2			○	○	○	○	

<Serial version>

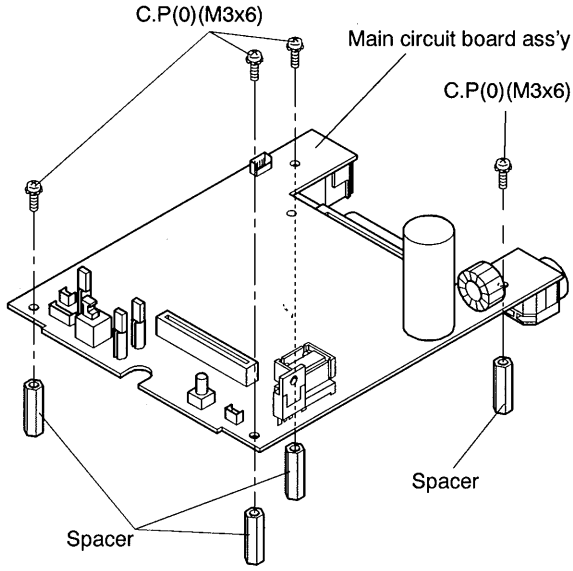


<Parallel version>



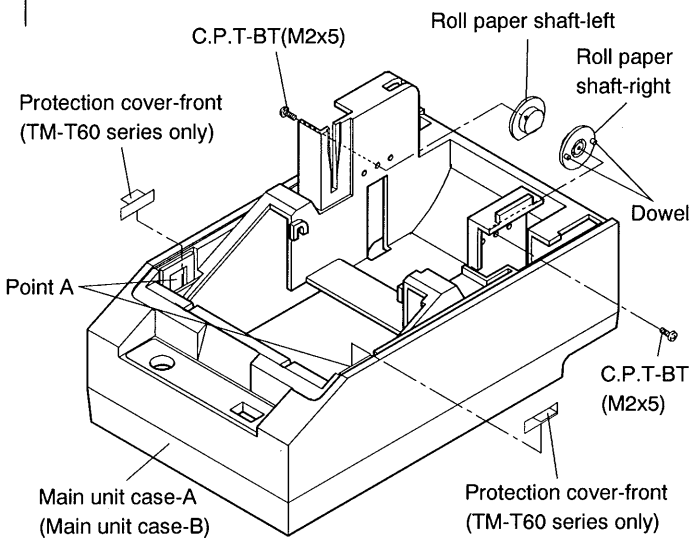
Sub-Assembly D Main Circuit Board Unit

Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
1	Main circuit board ass'y	○	○	○	○	○	○	● Fix the 4 spacers to main circuit board ass'y with C.P(O).
2	Spacer ×4	○	○	○	○	○	○	
	C.P(O) (M3×6) ×4	○	○	○	○	○	○	

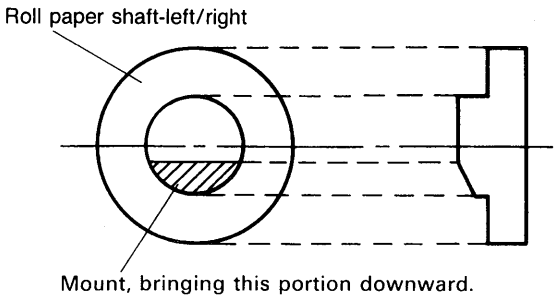


Sub-Assembly E Case Unit of Main Unit

Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
1	Main unit case-A	○	○					
2	Protection cover-front ×2	○	○					● Peel off the covering sheet of protection cover-front and stick it at point A of the main unit case-A (see diagram below).
3	Main unit case-B			○	○	○	○	
4	Roll paper shaft-left	○	○	○	○	○	○	● Align the dowel of roll paper shaft-left against the hole of main unit case A or B, and fasten it with C.P.T-BT.
5	Roll paper shaft-right	○	○	○	○	○	○	● Align the dowel of roll paper shaft-right against the hole of main unit case A or B, and fasten it with C.P.T-BT.
	C.P.T-BT (M2×5) ×2	○	○	○	○	○	○	

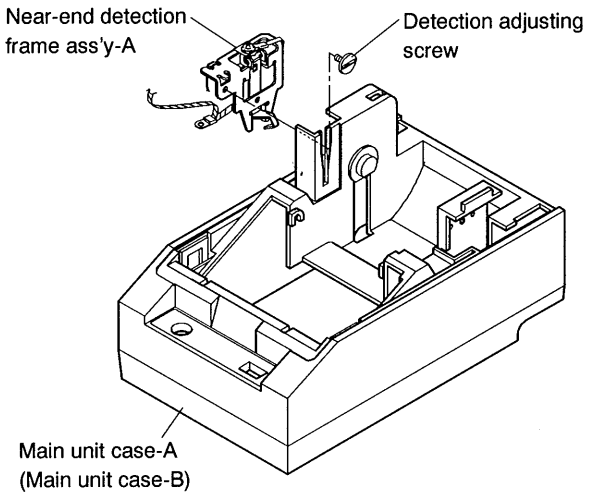


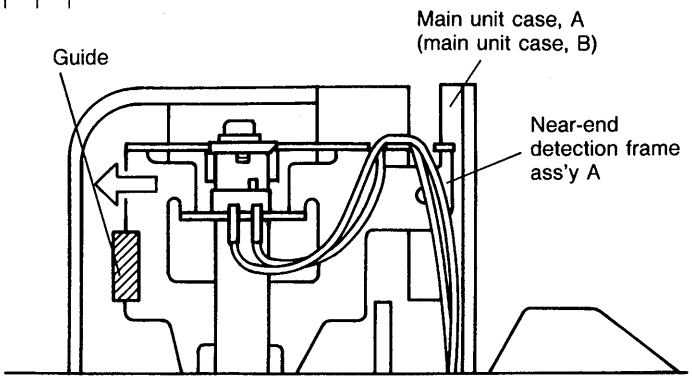
● **Note :** Pay attention not to confuse the left and right roll paper shafts.

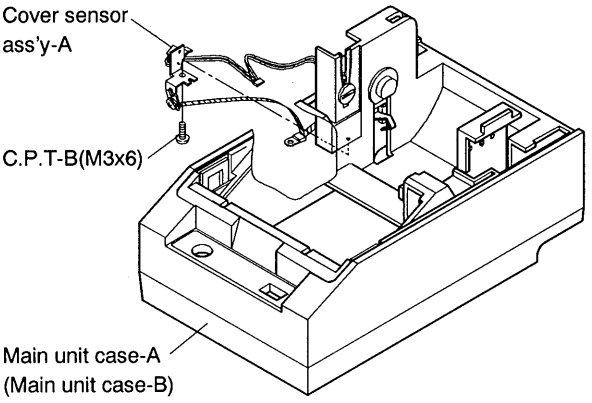


Sub-Assembly E

Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
6	Near-end detection frame ass'y-A Sub-Assembly B	○	○	○	○	○	○	● At first, set the cover sensor ass'y A at the mounting position of near-end sensor frame ass'y A of the main unit case, and then set the near-end sensor. Next, insert the frame of near-end sensor frame ass'y A into the guide of main unit case, and provisionally fasten it with the sensor adjustment screw.
7	Detection adjusting screw	○	○	○	○	○	○	● For adjusting method, see section 3.3.3 "Adjustments".
8	Cover sensor ass'y-A Sub-Assembly A	○	○	○	○	○	○	● Align the dowels of the main unit case against the holes of cover sensor ass'y-A, and fasten them with C.P.T-B.
	C.P.T-B (M3×6) ×1	○	○	○	○	○	○	

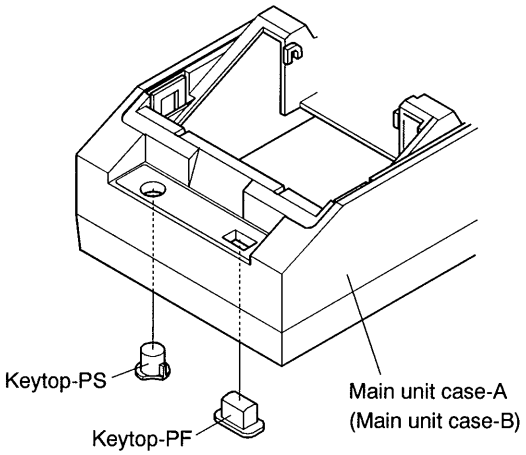






Sub-Assembly E

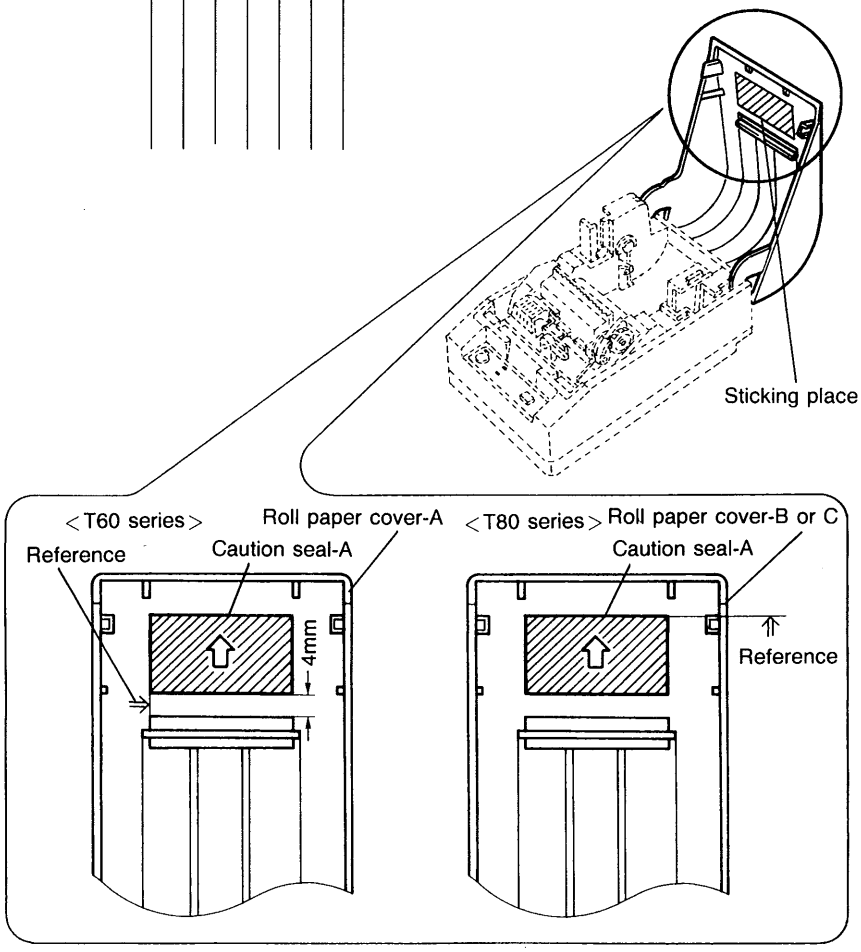
Assembly order	Assembly part		Device						Assembly point
			T60 series		T80 series				
			S	P	S	P	M	A	
9	Keytop-PS	×1	○	○	○	○	○	○	● Hold the keytop-PS floating over the round hole of main unit case A or B, and hold the keytop-PF floating over the rectangular hole, and then fix them into the case without tilting.
10	Keytop-PF	×1	○	○	○	○	○	○	

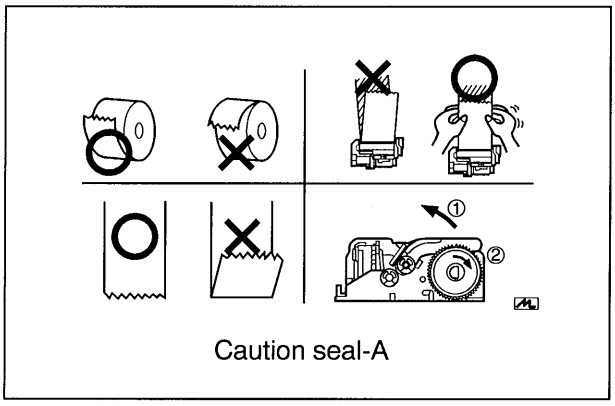


Note : Mount the floating keytops, making sure that it does not become tilted.

Sub-Assembly F | Roll Paper Cover Ass'y

Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
1	Roll paper cover-A	○	○					
1′	Roll paper cover-B			○	○	○		
1″	Roll paper cover-C						○	
2	Caution seal-A	○	○	○	○	○	○	● Peel off the covering paper of caution seal A, and stick it inside the roll paper cover A, B, or C. **Note** : Clean the sticking place of caution seal, before sticking it.

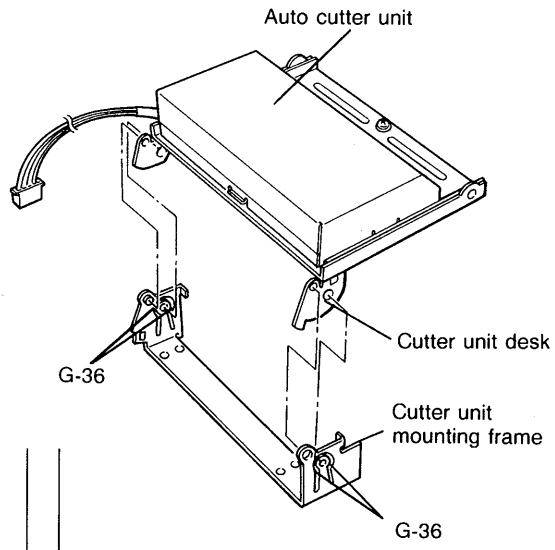




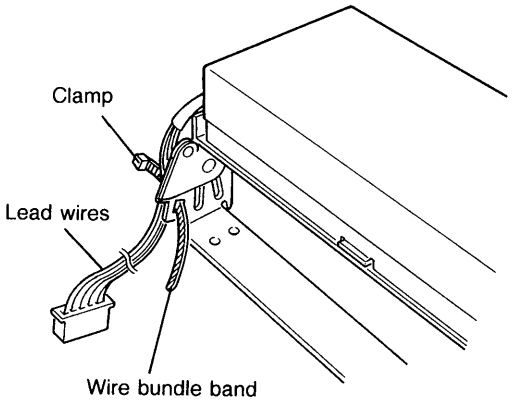
Caution seal-A

Sub-Assembly G Auto Cutter Unit

Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
1	Auto cutter unit						◎	
2	Cutter unit mounting frame						◎	● Set the auto cutter unit on the cutter unit mounting frame, aligning its holes against the dowels of the mounting frame.
3	Wire bundle band				◎			● Fasten the lead wires of auto cutter unit onto the cutter unit mounting frame, using the wire bundle band. Pass the wire bundle band from the left toward the right side, bringing the clamp on the inside.



● Apply G-36 to the contact points of cutter unit desk and cutter unit mounting frame.



Note : Make sure that the lead wires do not get trapped.

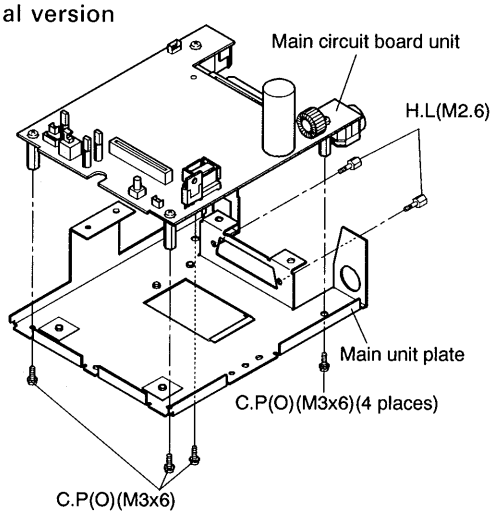
3.3.2 Main Assemblies

Main-Assemby A Main Circuit Board Unit, Main Unit Plate Auxiliary Panel, Mechanism Mounting Panel

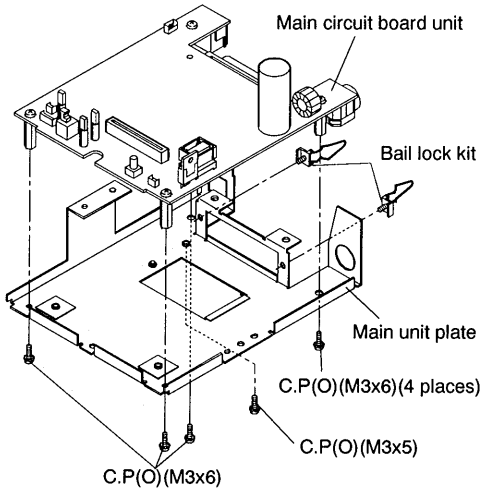
Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
1	Main unit plate	○	○					● Mount the main circuit board unit on the main unit plate or main unit plate ass'y with C.P(O).
1′	Main unit plate ass'y			○	○	○	○	
	Sub-Assembly C							
	Main circuit board unit	○	○	○	○	○	○	
	Sub-Assembly D							
	C.P (0) (M3×6) ×4	○	○	○	○	○	○	
	C.P (0) (M3×5) ×1		○		○			
2	H.L (M2.6) ×2	○		○		◌	◌	● Mount H.L on the I/F connector that is fitted onto the main circuit board unit.
2′	Bail lock kit ×2		○		○		◌	● Mount bail lock kit on the I/F connector that is fitted onto the main circuit board unit.

<T60 series>

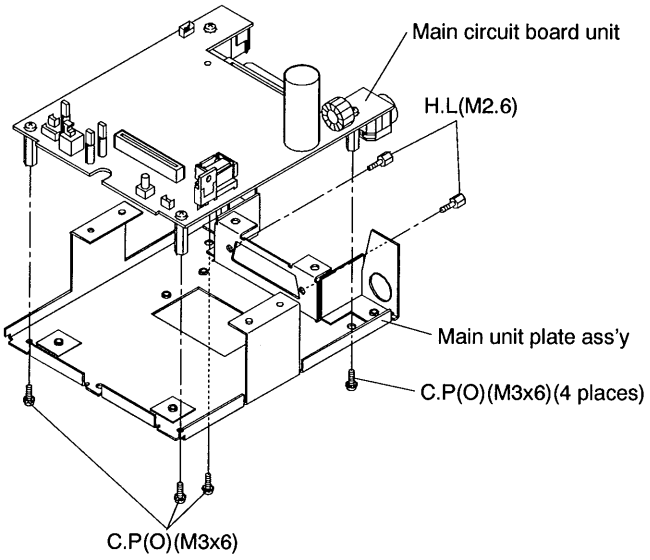
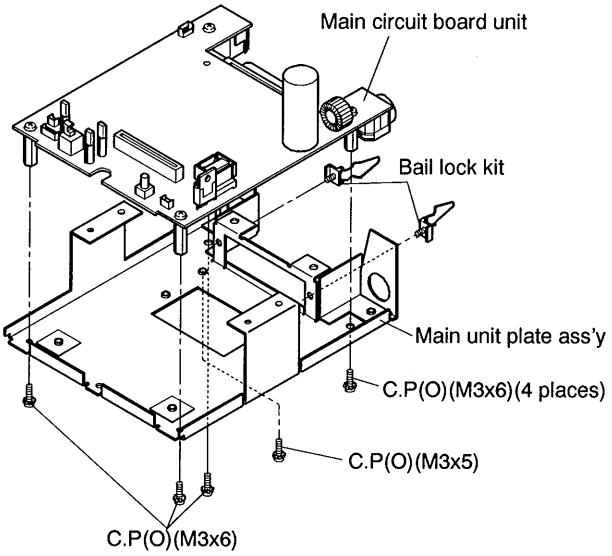
● Serial version



● Parallel version

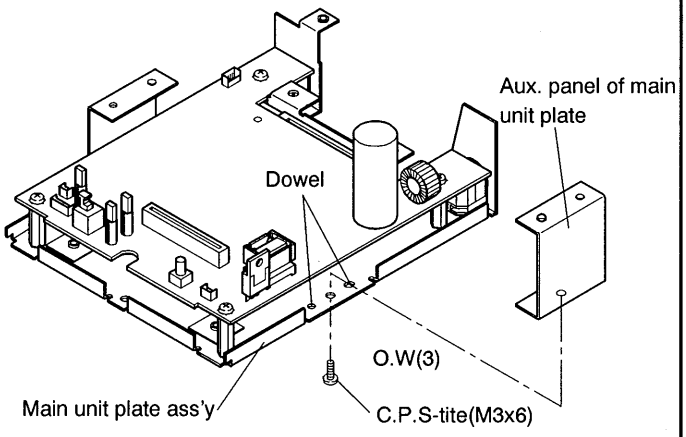


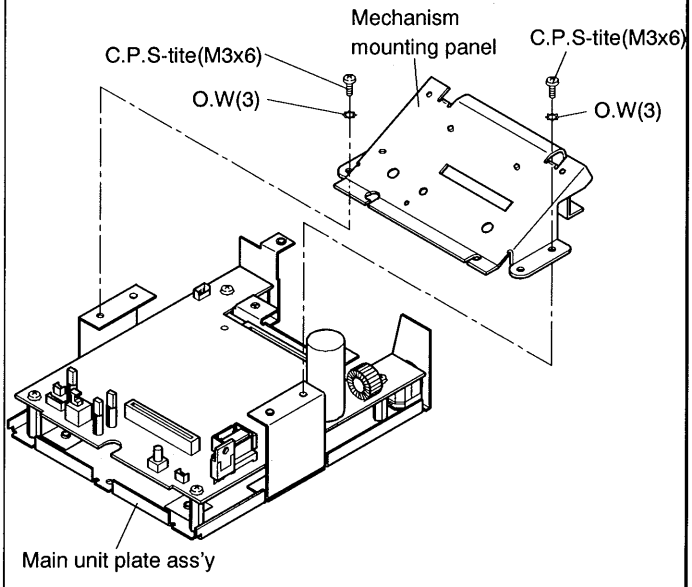
Main-Assembly A

Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
								<T80 series> ● Serial version  ● Parallel version 

Main-Assembly A

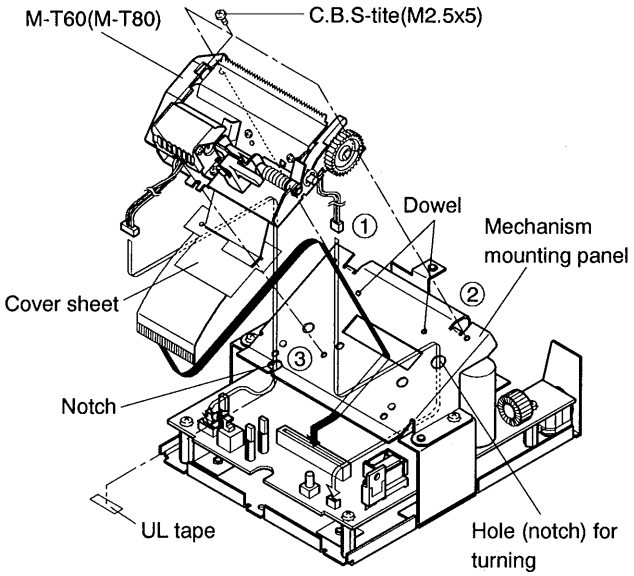
Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
3	Auxiliary panel of main unit plate	○	○					● Align the holes of aux panel of the main unit plate against the dowels of main unit plate ass'y, and fasten them with C.P.S-tite.
	C.P.S-tite (M3×6) ×1	○	○					
	O.W(3) ×1	○	○					
4	Mechanism mounting panel	○	○	○	○	○	○	● Align the holes of mechanism mounting panel against the dowels of aux panel of the main unit plate and the main unit plate ass'y, and fasten them with C.P.S-tite.
	C.P.S-tite (M3×6) ×2	○	○	○	○	○	○	
	O.W(3) ×2	○	○	○	○	○	○	

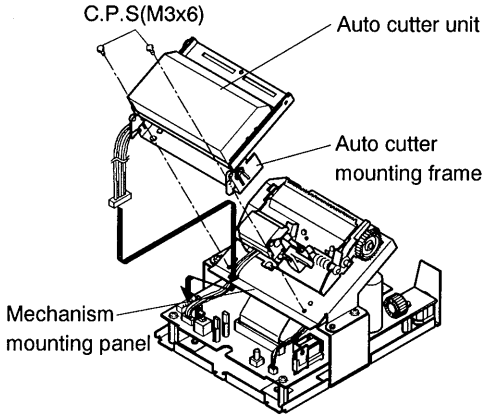




Main-Assembly B Printer Mechanism

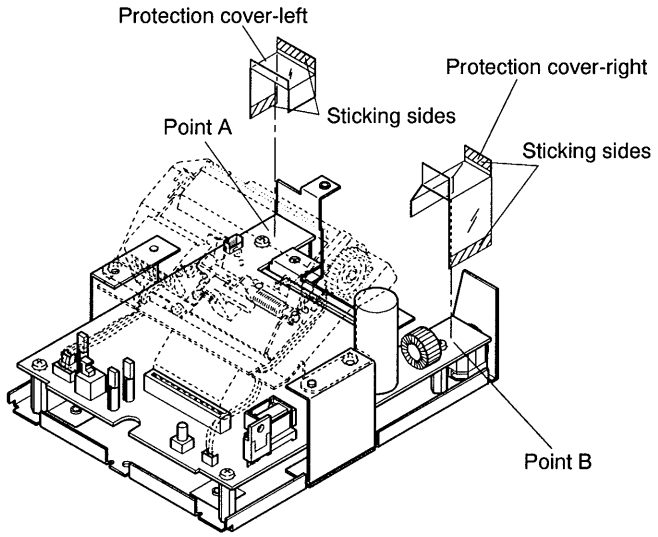
Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
1	M-T60	○	○					● Pass the F.P.C of printer mechanism unit through the slit of its mounting panel, along the arrow ➡ direction of the following diagram.
1′	M-T80			○	○	○	○	● Align the holes of printer mechanism unit against the dowels of its mounting panel, and fasten them with C.B.S-tite. While fastening, tighten the screws in the order given in the following diagram.
	C.B.S-tite (M2.5×5) ×3	○	○	○	○	○	○	
2	Cover sheet	○	○	○	○	○	○	
3	Auto cutter unit Sub-Assembly G						◎	● Align the holes of auto cutter mounting frame against the dowels of mechanism mounting panel, and fasten them with C.P.S.
	C.P.S (M3×6) ×2						◎	
4	UL tape ×1			○	○	○		● Stick the UL tape on the reverse side of lead wire processing portion of mechanism mounting panel. ● Insert the lead wires and F.P.C. of printer mechanism unit as well as the lead wire of auto cutter unit into their prescribed connectors (see diagram above). **Note :** Mount the printer mechanism unit and auto cutter unit, making sure that the lead wires do not get trapped, and that the mechanism unit does not ride over the dowels.

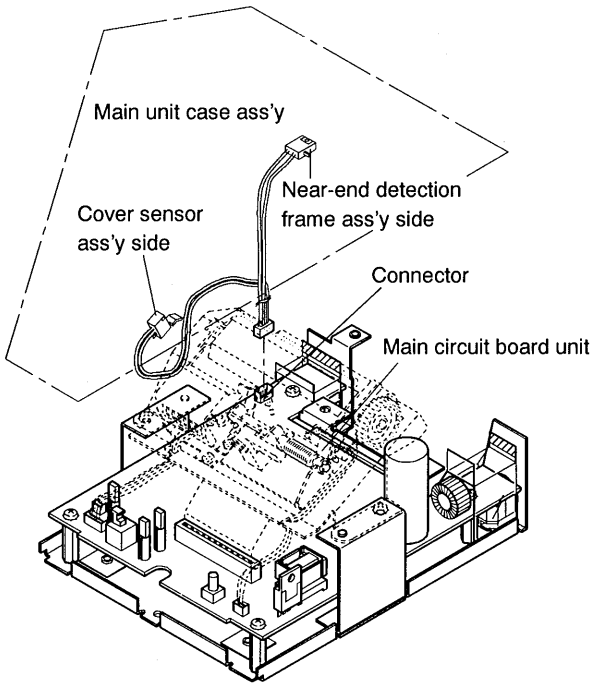




Main-Assembly C Protection Cover-Left and Right, Main Unit Case Ass'y

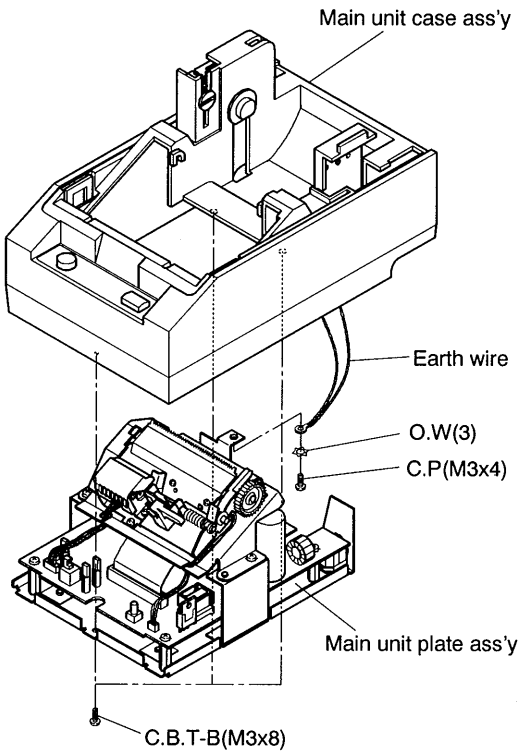
Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
1	Protection cover-left	○	○					● Stick the protection covers at points A and B of the main circuit board unit.
2	Protection cover-right	○	○					
3	Main unit case ass'y-A Sub-Assembly E	○	○					● Connect the lead wires coming from the cover sensor ass'y and near-end detection frame ass'y into the connector of main circuit board unit.
3′	Main unit case ass'y-B Sub-Assembly E			○	○	○	○	





Main-Assembly C

Assembly order	Assembly part		Device						Assembly point
			T60 series		T80 series				
			S	P	S	P	M	A	
	C.P(M3×4)	×1	○	○	○	○	○	○	● Attach the earth wire (relay terminal) to the main unit plate ass'y with C.P. and mount the main unit case ass'y on the main unit plate ass'y with C.B.T-B.
	O.W(3)	×1	○	○	○	○	○	○	
	C.B.T-B (M3×8)	×3	○	○	○	○	○	○	

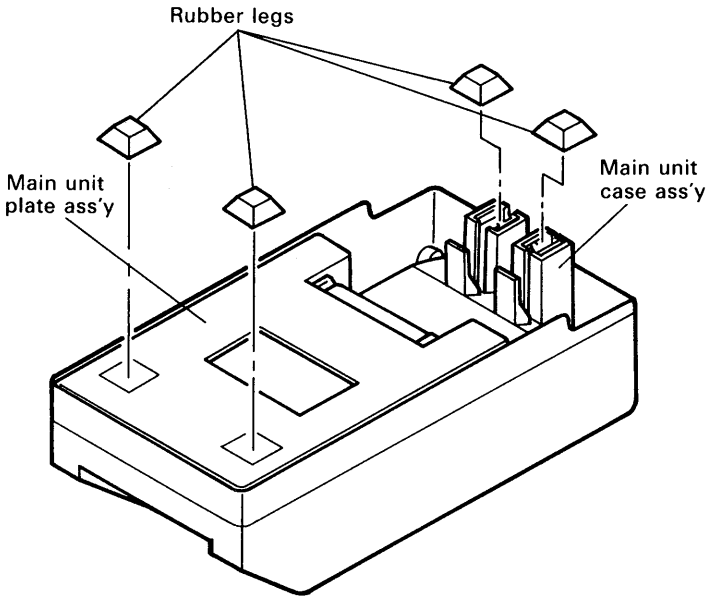


Note:

- While mounting the main unit case ass'y, pay attention to prevent the lead wire from getting trapped.
- While mounting the main unit case ass'y, make sure that the entire top surface of LED remains visible through its LED window.

Main-Assembly D Rubber Legs, IC Cover Ass'y

Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
1	Rubber legs ×4	○	○	○	○	○	○	● Peel off the covering paper of rubber legs, and stick them onto the main unit plate ass'y and main unit case ass'y. <Serial version>



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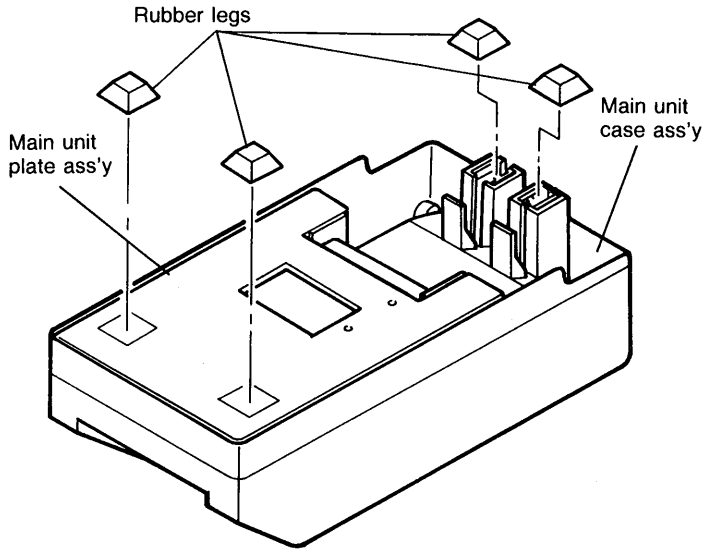
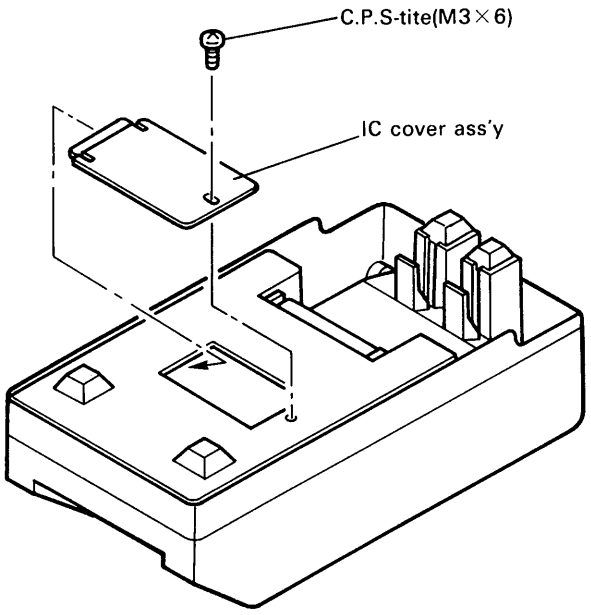
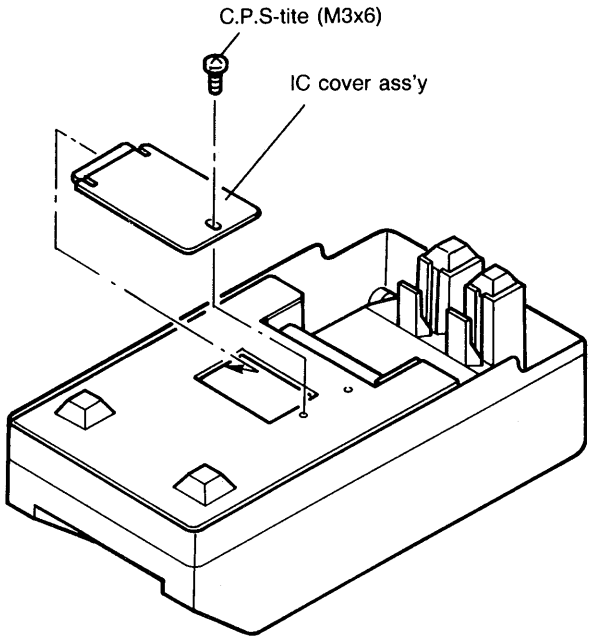


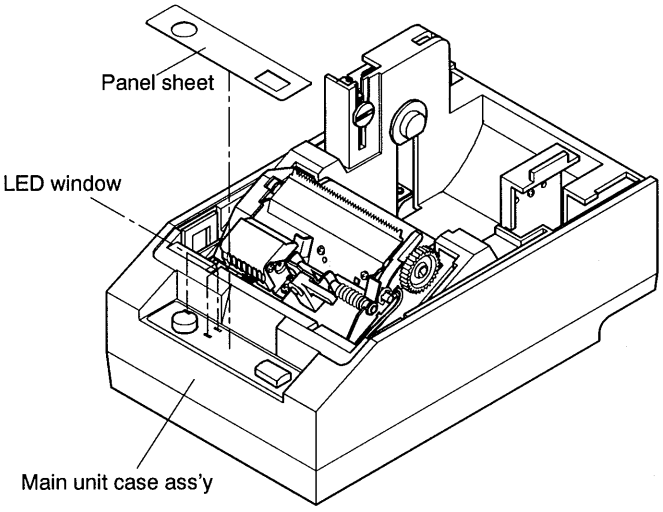
Note:
Clean the sticking places of main unit plate ass'y and main unit case ass'y, before sticking the rubber legs.

Main-Assembly D

Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
2	IC cover ass'y	○	○	○	○	○	○	● Mount the IC cover ass'y onto the rectangular window of main unit plate ass'y
	C.P.S-tite (M3×6) ×1	○	○	○	○	○	○	<Serial version>  <Parallel version> 

Main-Assembly E Panel Sheet, Roll Paper Cover Ass'y

Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
1	Panel sheet	○	○	○	○	○	○	● Peel off the covering paper of panel sheet, and stick it onto the main unit case ass'y.

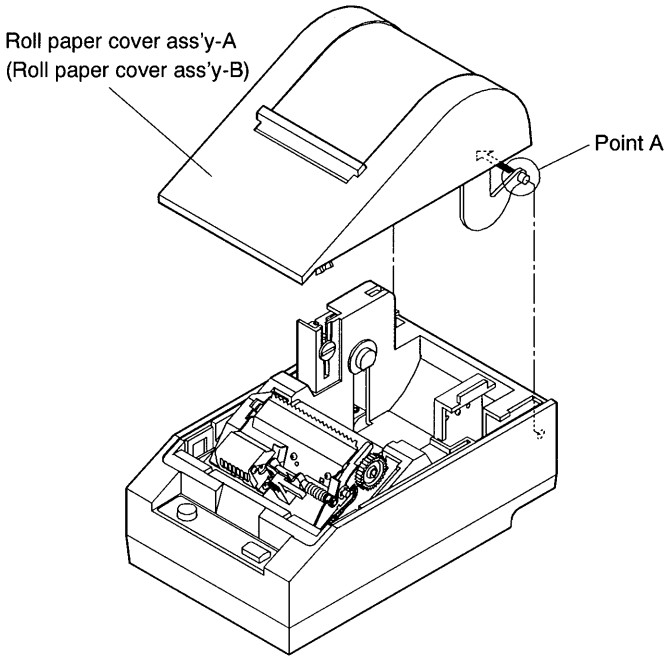


Note:

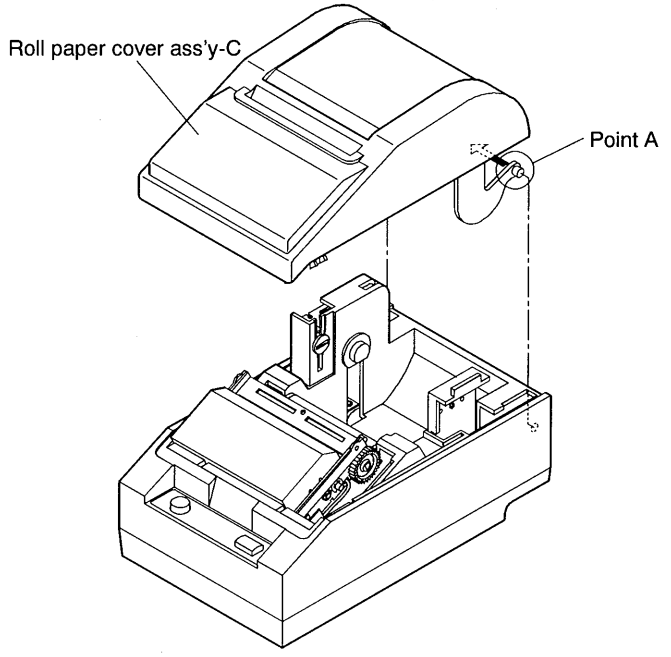
- Clean the sticking place of main unit case ass'y, before sticking the panel sheet.
- While sticking, make sure that the panel sheet does not protrude onto the buttons and LED, or beyond the frame of main unit case ass'y.

Main-Assembly E

Assembly order	Assembly part	Device						Assembly point
		T60 series		T80 series				
		S	P	S	P	M	A	
2	Roll paper cover ass'y-A [Sub-Assembly F]	○	○					● Allowing about 5mm of uniform slackening at points A (left and right) of the roll paper cover ass'y along the arrow direction, stick it onto the main unit case ass'y. Close the roll paper cover ass'y.
2'	Roll paper cover ass'y-B [Sub-Assembly F]			○	○	○		
2''	Roll paper cover ass'y-C [Sub-Assembly F]						○	



<TM-T80 series with auto cutter>

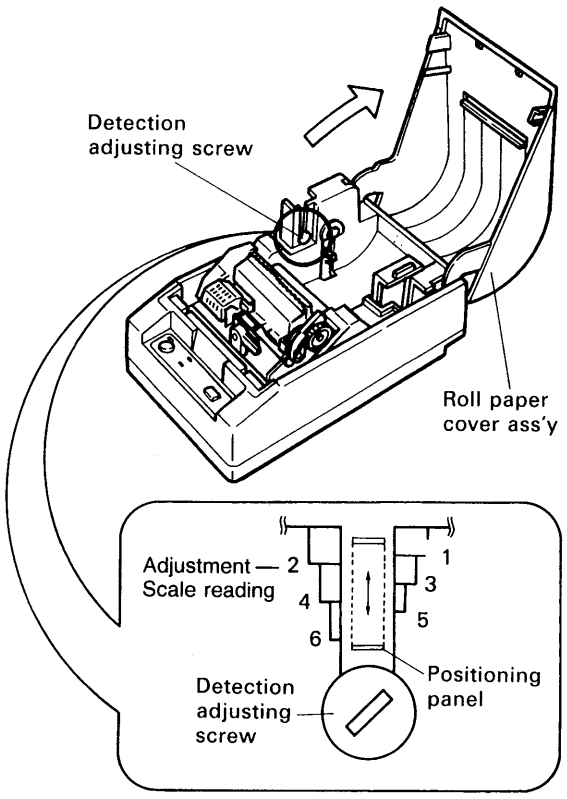


Note : While sticking the roll paper cover ass'y, do not excessively bend it at point A.

3.3.3 Adjustments

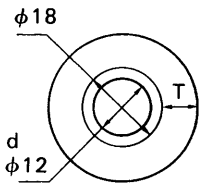
Adjustment of Minimum Residual Amount of Roll Paper (TM-T60, T80 serise)

Step	Content	Adjustment
1	Open roll paper cover ass'y.	
2	Loosen the detection adjusting screw.	
3	Bring the top end of positioning panel at the desired reading of adjustment scale (refer to table of minimum residual amount of roll paper, when using CASIO prescribed paper).	
4	After positioning, tighten the detection adjusting screw.	
5	Close the roll paper cover ass'y.	
6	If the minimum residual amount of the roll paper becomes incorrect, repeat the above steps 2 and 3.	



● Table of minimum residual amount of roll paper, when using CASIO prescribed paper

Adjustment scale reading	Dimension T (mm)
#1	About 0
#2	About 2
#3	About 4
#4	About 6
#5	About 8
#6	About 10



Note : The values of T in the above table are based on the following conditions.

- Calculated value, when the inner diameter ϕd of roll paper core is 12mm, and outer diameter is 18mm.
- The fluctuations caused by individual devices are not taken into account.

3.4 DISASSEMBLY OF AUTO CUTTER UNIT (OPTION)

- Disassemby is basically done in the opposite order of section 3.5 "Assembly".
- Be sure not to disassemble beyond the "Auto cutter unit disassembly diagram" given in Capter 6 "Apperdix", or the function may be disrupted.

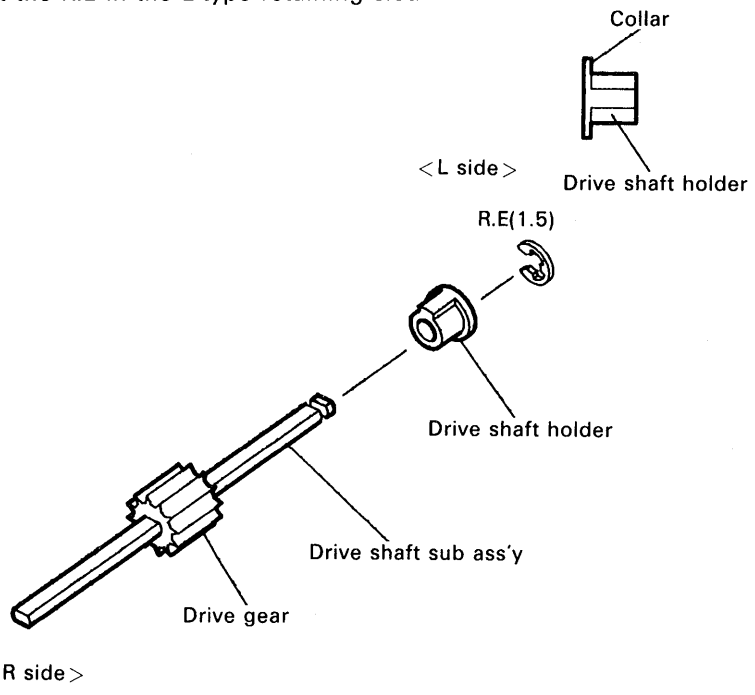
3.5 ASSEMBLY OF AUTO CUTTER UNIT (OPTION)

- Assembly is divided into a main assembly and a sub assembly. At first, make the sub assembly, and then proceed to make the main assembly.
- Assemble while checking the shape and mounting position of parts in the "Auto cutter unit disassembly diagram" given in Chapter 6 "Appendix".
- ★ Mark in the Assembly order column shows that check is required.
- A circle around the number in the Assembly order column indicates that lubrication is required before the part is installed. Applying the lubricant would be difficult once the part has been installed. See "Lubrication points" in 5.2.3 for the details. And also refer to the Auto cutter unit lubrication and adhesion diagram in Chapter 6 "Appendix".

3.5.1 Sub Assemblies

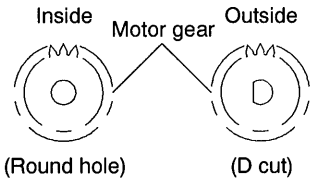
Sub-Assembly A | Drive Shaft Ass'y

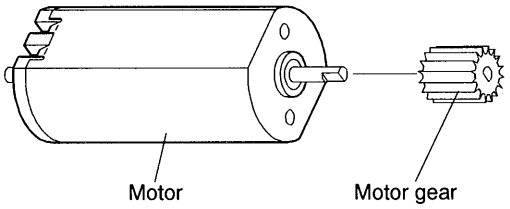
Assembly order	Assembly part	Assembly point
1 2	Drive shaft Drive shaft holder R.E (1.5) ×1	● Set the drive shaft holder with the collar coming on the outside. ● Set the R.E in the E-type retaining slot.



Sub-Assembly B Motor Ass'y

Assembly order	Assembly part	Assembly point
1 2	Motor Motor gear	● Insert the motor gear from its round hole side into the D-cut shaft of motor so that the D-cut hole of the gear finally fit together.

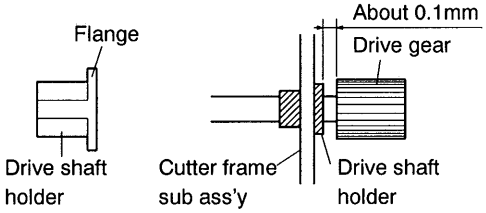


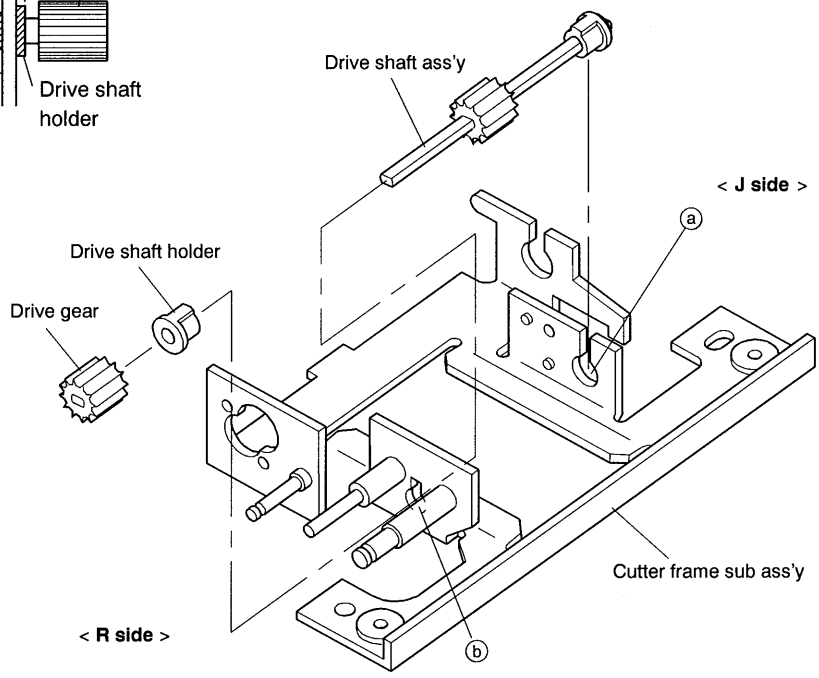


3.5.2 Main Assemblies

Main-Assembly A Transmission Mechanism

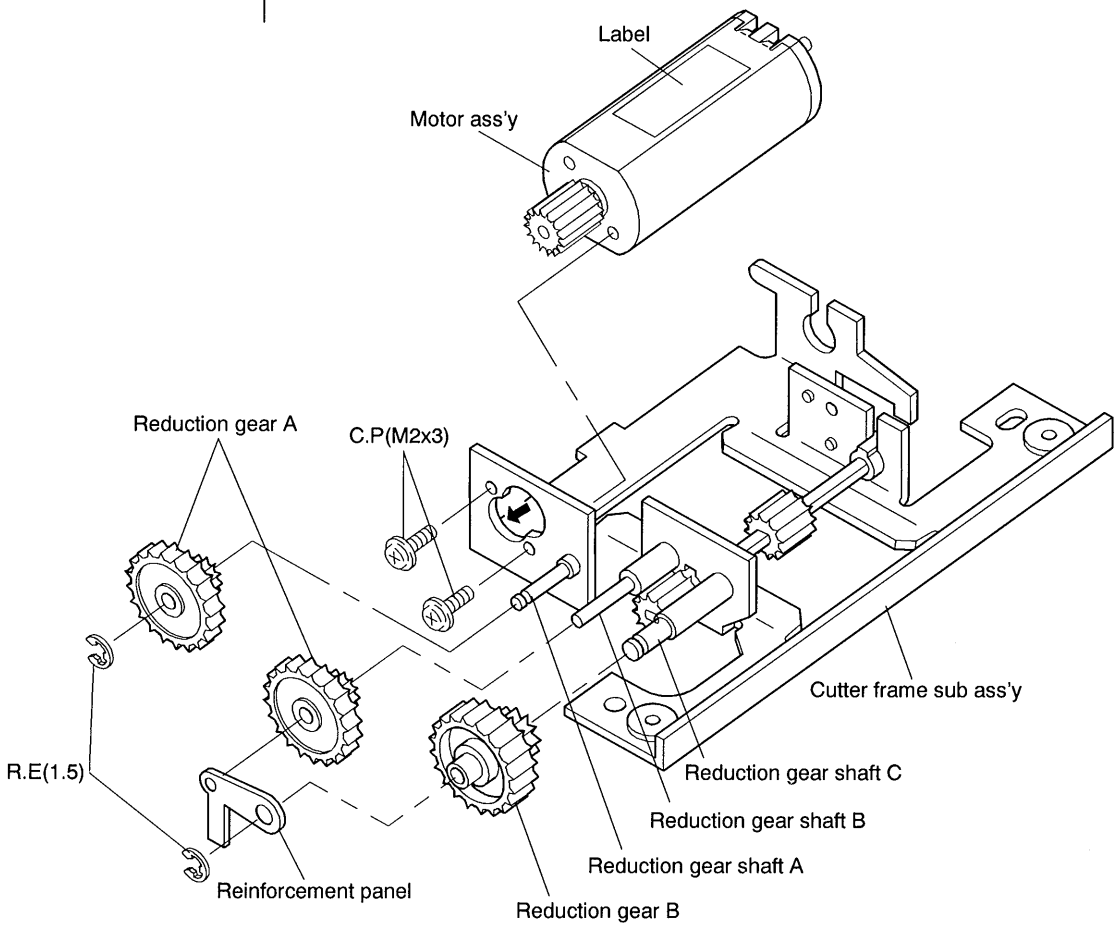
Assembly order	Assembly part	Assembly point
①	Cutter frame sub ass'y	
2	Drive shaft ass'y Sub-Assembly A	● Insert the shaft of the drive shaft ass'y into groove ⓐ of the cutter frame sub ass'y and insert the other end into hole ⓑ.
3	Drive shaft holder	● Hold the drive shaft holder with its flange side facing outward and place it onto the shaft, fitting it into hole ⓑ.
4	Drive gear	Then press the drive gear onto the shaft using the press fitting tool.
★		<CHECK> ● About 0.1mm clearance must be maintained between the drive gear and the drive shaft holder.



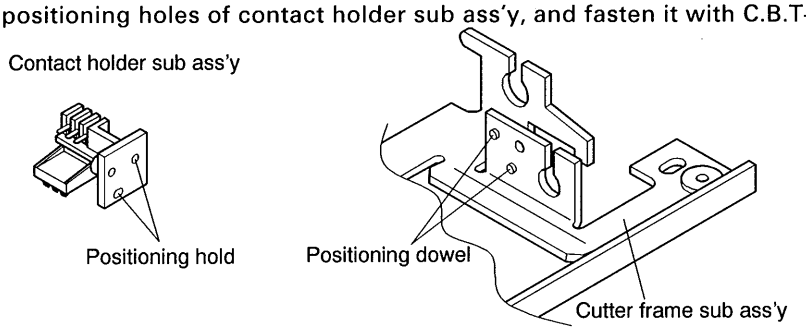
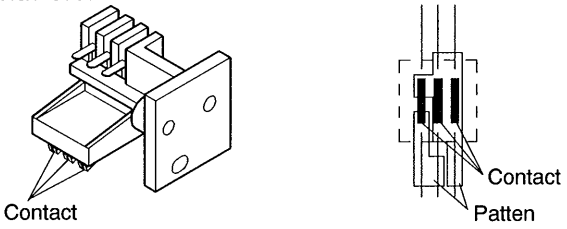
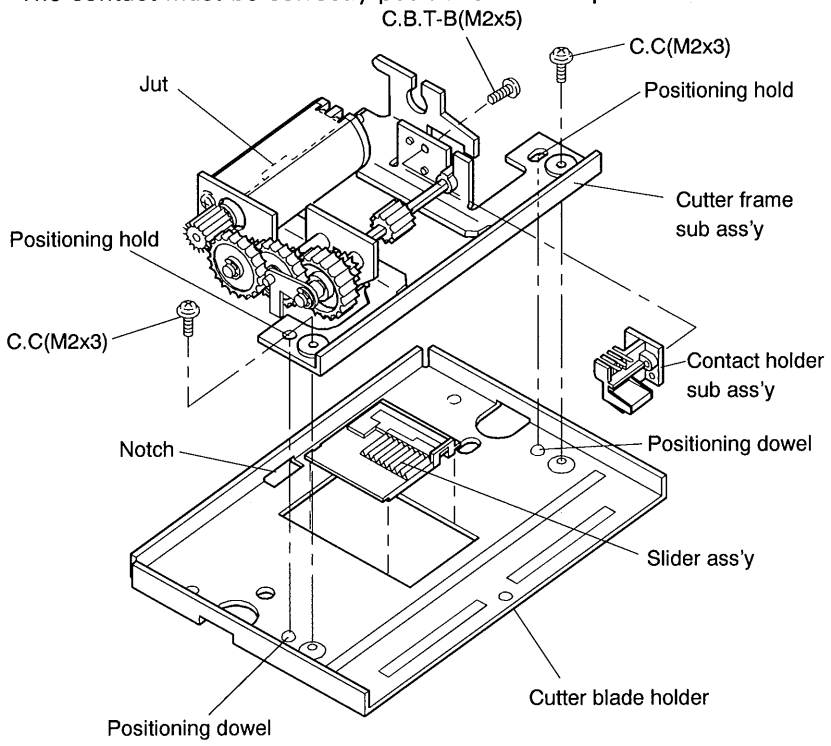


Main-Assembly A

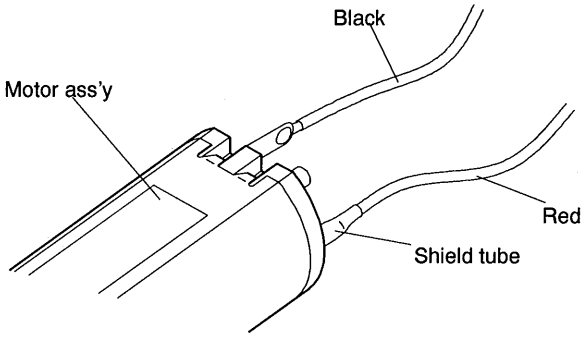
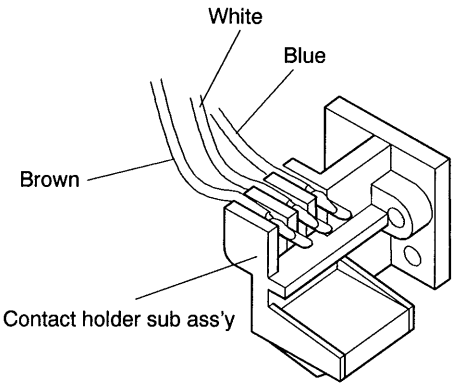
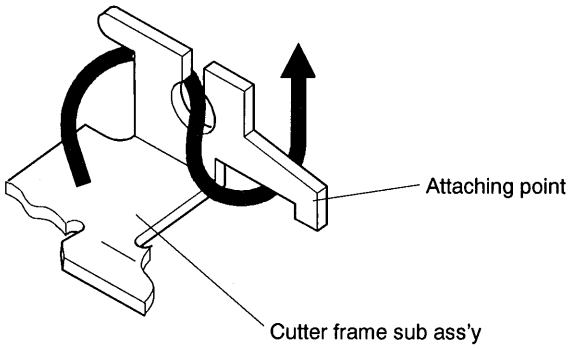
Assembly order	Assembly part	Assembly point
5	Motor ass'y Sub Assembly B C.P (M2×3) ×2	● Set the motor ass'y with its label facing upward, move it along the arrow direction, and fasten it with screws.
6	Deceleration gear B ×1	● Set the deceleration gear B on the deceleration gear shaft C
7	Deceleration gear A ×2	● Set the deceleration gears A on the deceleration gear shafts B and A, in this given order.
8	Auxiliary panel R.E (1.5) ×2	● Set the auxiliary panel on the deceleration gear shafts B and C. ● Set the R.E on the deceleration gear shafts A and C.



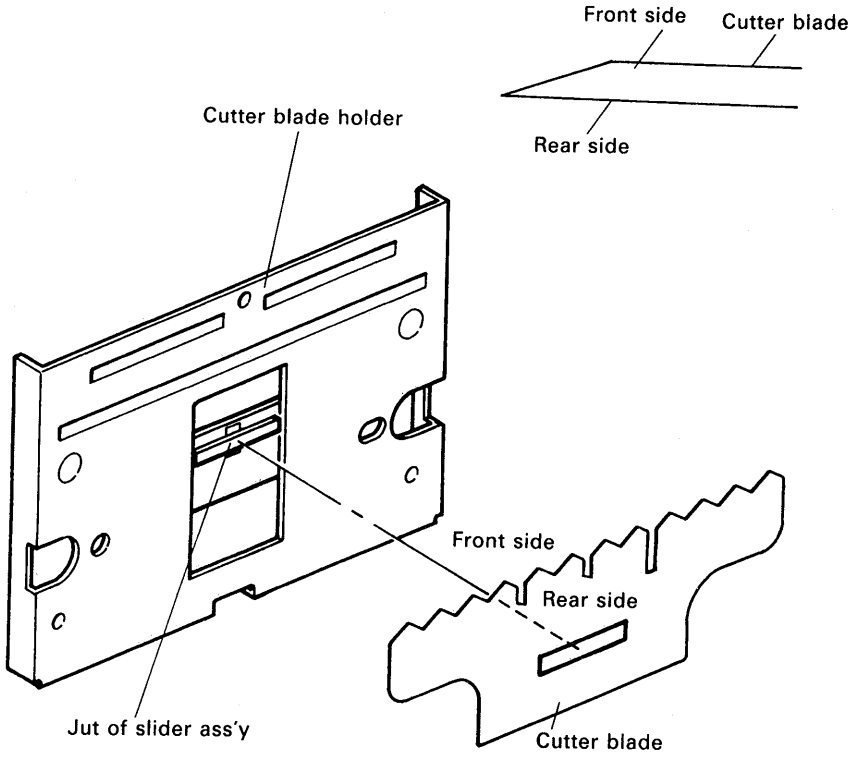
Main-Assembly B Detection Mechanism

Assembly order	Assembly part	Assembly point
1	Cutter blade holder	
2	Slider ass'y C.C (M2×3) ×2	● Set the slider ass'y on the cutter blade holder. ● Insert the jut of cutter frame sub ass'y into the notch of the cutter blade holder. ● Align the 2 positioning dowels of the cutter blade holder against the 2 oblong positioning holes of the cutter frame sub ass'y, and fasten them with C.C provisionally.
3	Contact holder sub ass'y C.B.T-B (M2×5) ×1	● Align the 2 positioning dowels of cutter frame sub ass'y against the 2 positioning holes of contact holder sub ass'y, and fasten it with C.B.T-B. 
★		● Position the cutter frame sub ass'y, so that the contacts of contact holder sub ass'y touches the pattern on the detection circuit board, and then fasten it with C.C.  <CHECK> ● Do not bend the contact ● The contact must be correctly positioned on the pattern of slider ass'y. 

Main-Assembly B

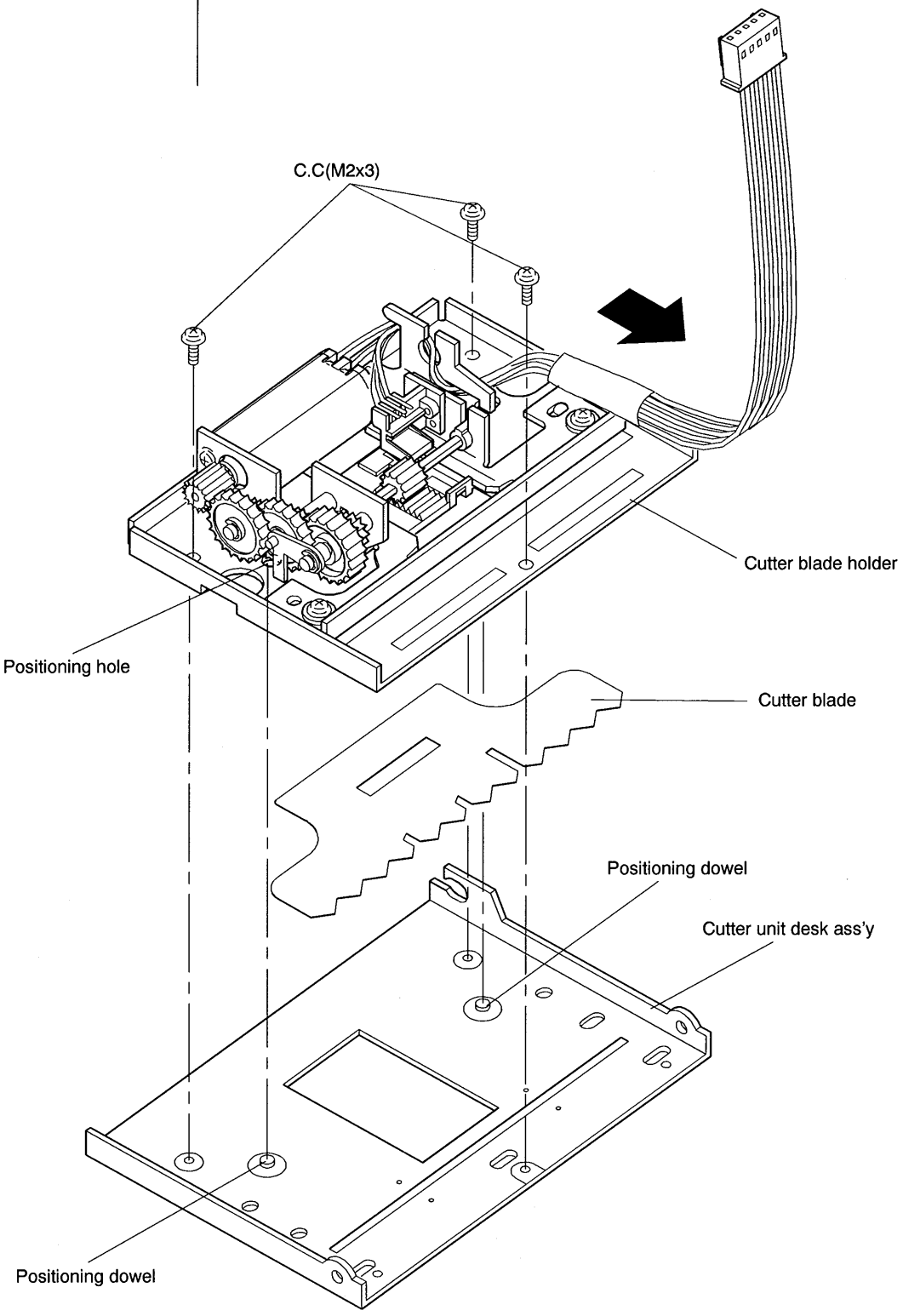
Assembly order	Assembly part	Assembly point
4 5 6	Connector sub ass'y Shield tube Soldering	● Pass the tube over the red lead wire of connector sub ass'y. ● Cover the shield tube on the soldering of red lead wire. • Black lead wire —— Terminal of the motor ass'y (Contact holder sub ass'y side) • Red lead wire —— Terminal of the opposite side motor ass'y • Brown lead wire • White lead wire —— Contact holder sub ass'y • Blue lead wire  
★		<CHECK> ● Do not confuse the colors of lead wires.
7	Wiring of lead wire	● Pass the lead wire through the attachment of cutter frame sub ass'y. 

Main-Assembly C Cutter Mechanism

Assembly order	Assembly part	Assembly point
1	Cutter blade	● Bring the front side of cutter blade on the side of cutter blade holder, then align the jut of slider ass'y against the hole of the cutter blade, and set it there. <CHECK> ★ ● Do not confuse the front and rear sides of cutter blade. 

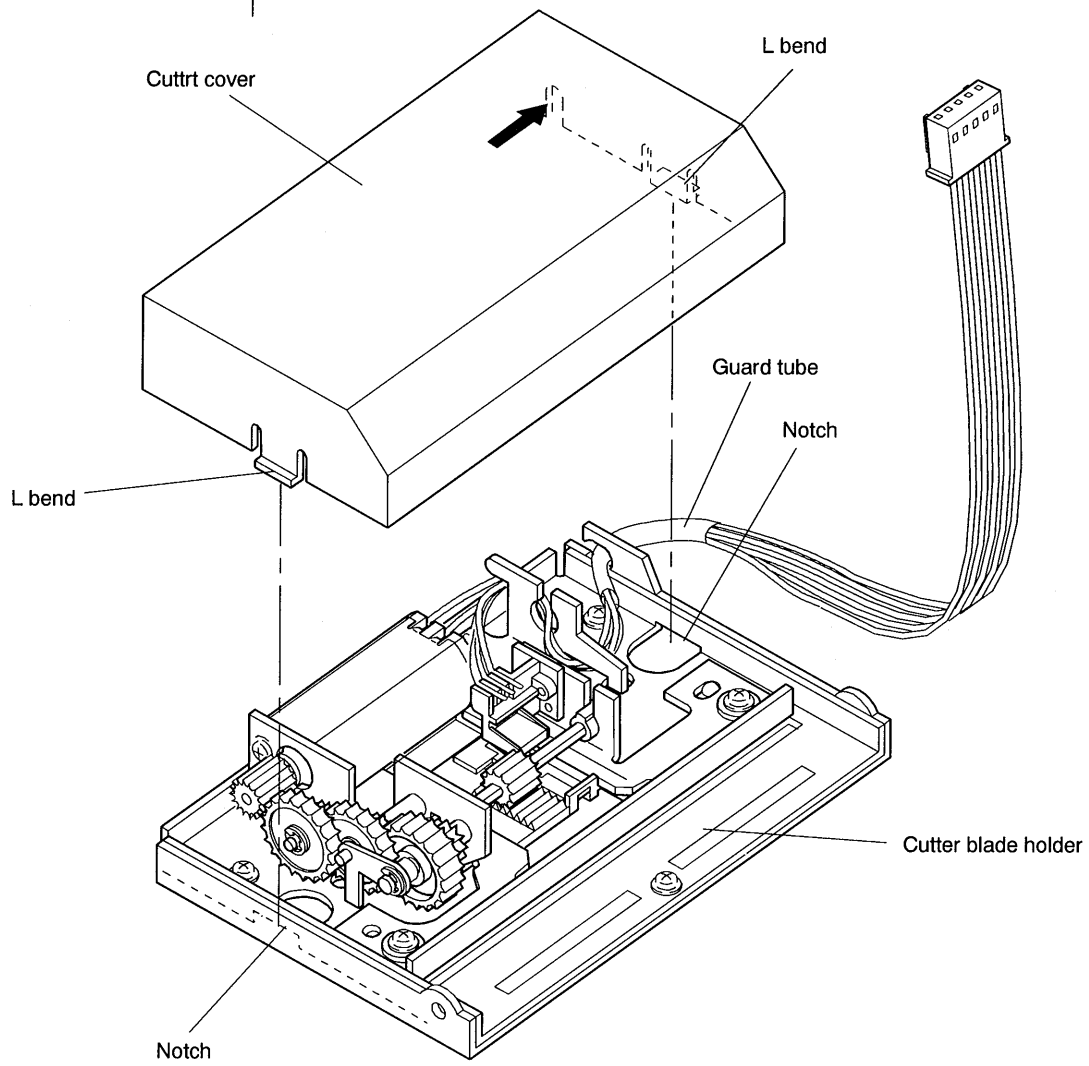
Main-Assembly C

Assembly order	Assembly part	Assembly point
2	Cutter unit desk ass'y C.C (M2×3) ×3	● Align the positioning dowels of cutter unit desk ass'y against the positioning hole of cutter blade holder, and fasten it with C.C. ● The cutter blade must operate smoothly, when the motor gear is rotated.



Main-Assembly C

Assembly order	Assembly part	Assembly point
3	Cutter cover	● Position the cutter cover so that when it is set, the guard tube of connector ass'y comes at the notch (arrow pointed). ● Position and set the two L bends of cutter cover at the two notches of cutter blade holder.



– MEMO –

CHAPTER 4

TROUBLESHOOTING

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4.1 OUTLINE

- As a rule, all faulty parts are repaired by replacing the entire units. Therefore, if a trouble develops, follow the flow chart and locate the faulty unit, and then replace it.
- If at all fine repairs inside the faulty unit (main circuit board) are desirable, refer to the 6.7 "Electrical circuit diagrams" and locate the faulty part, and then replace it.
- As a rule, mechanical unit shall not be fine repaired; but instead the entire units shall be replaced. However, auto cutter unit may be fine repaired by referring to the disassembling and assembling procedures of Chapter 3, and the "Auto cutter unit disassembly diagram" given in Chapter 6.
- A list of main units and a list of measuring instruments used for repairs is given below.

<**Main units**>

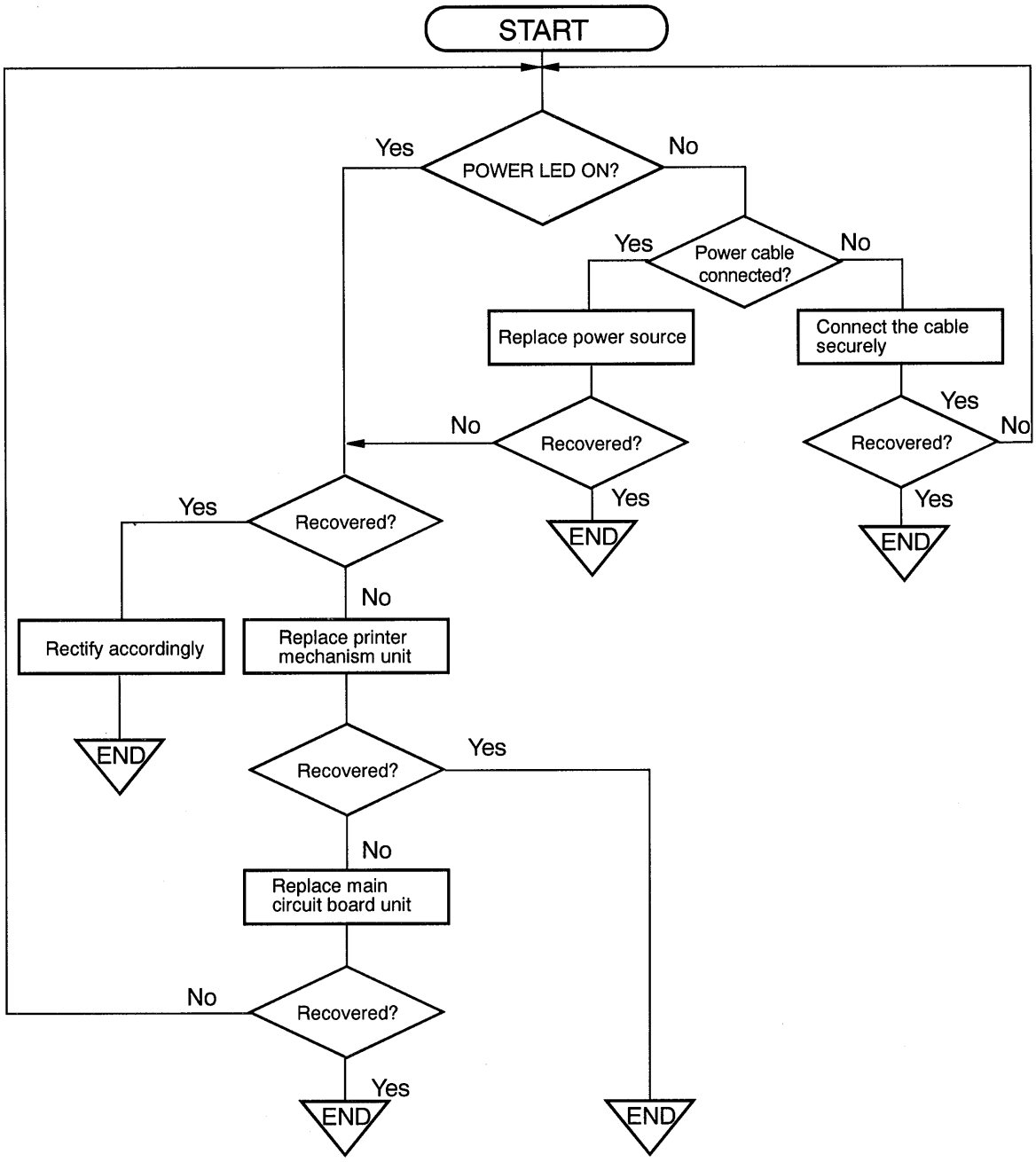
Name	Function
Printer mechanism unit	Printing
Main circuit board unit	Control
Auto cutter unit (option)	Paper cutting

<**Measuring instruments**>

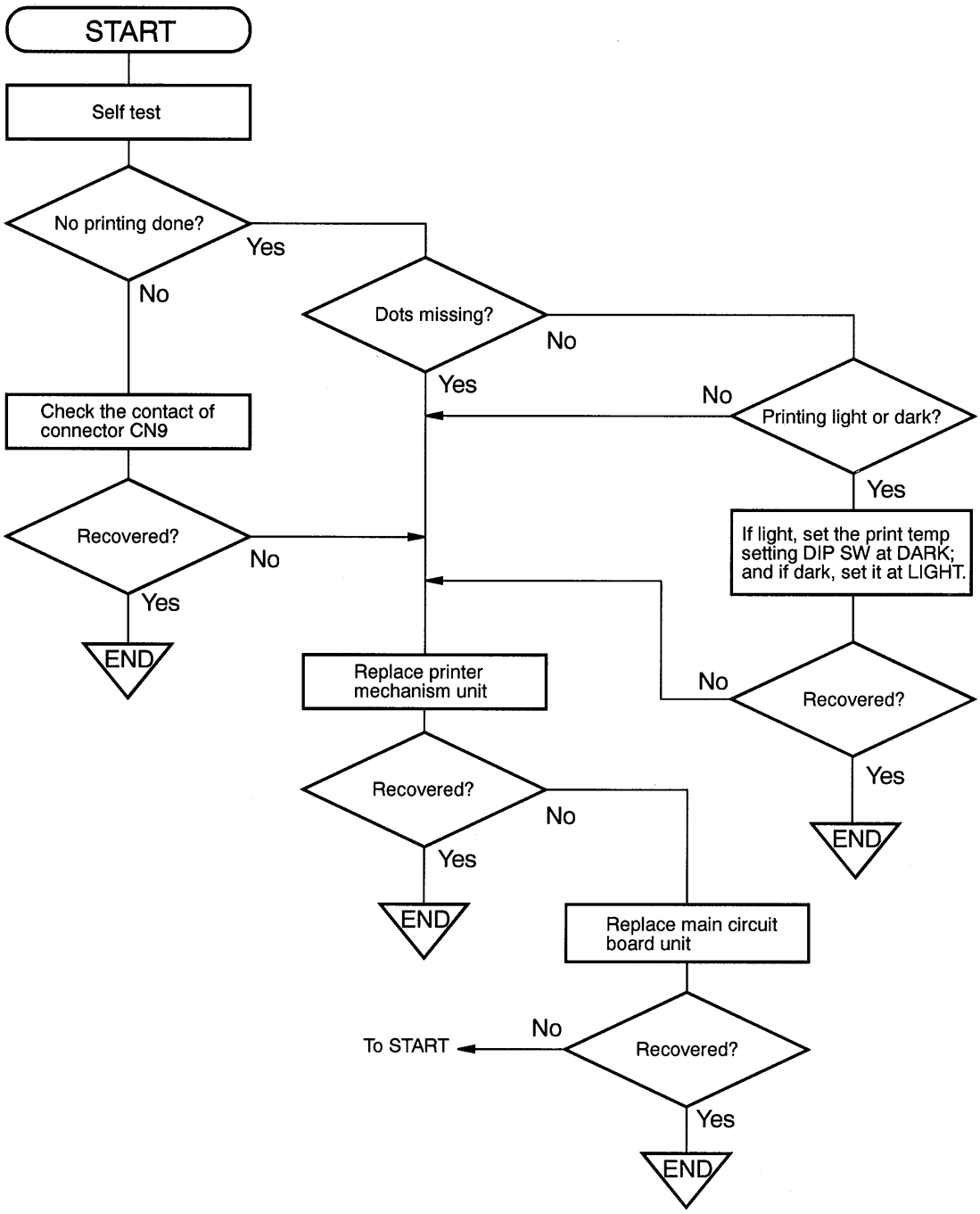
Name	Function
Tester	Measurement of DC voltage and resistance
Oscilloscope	With storage function is desirable

4.2 FLOW CHARTS

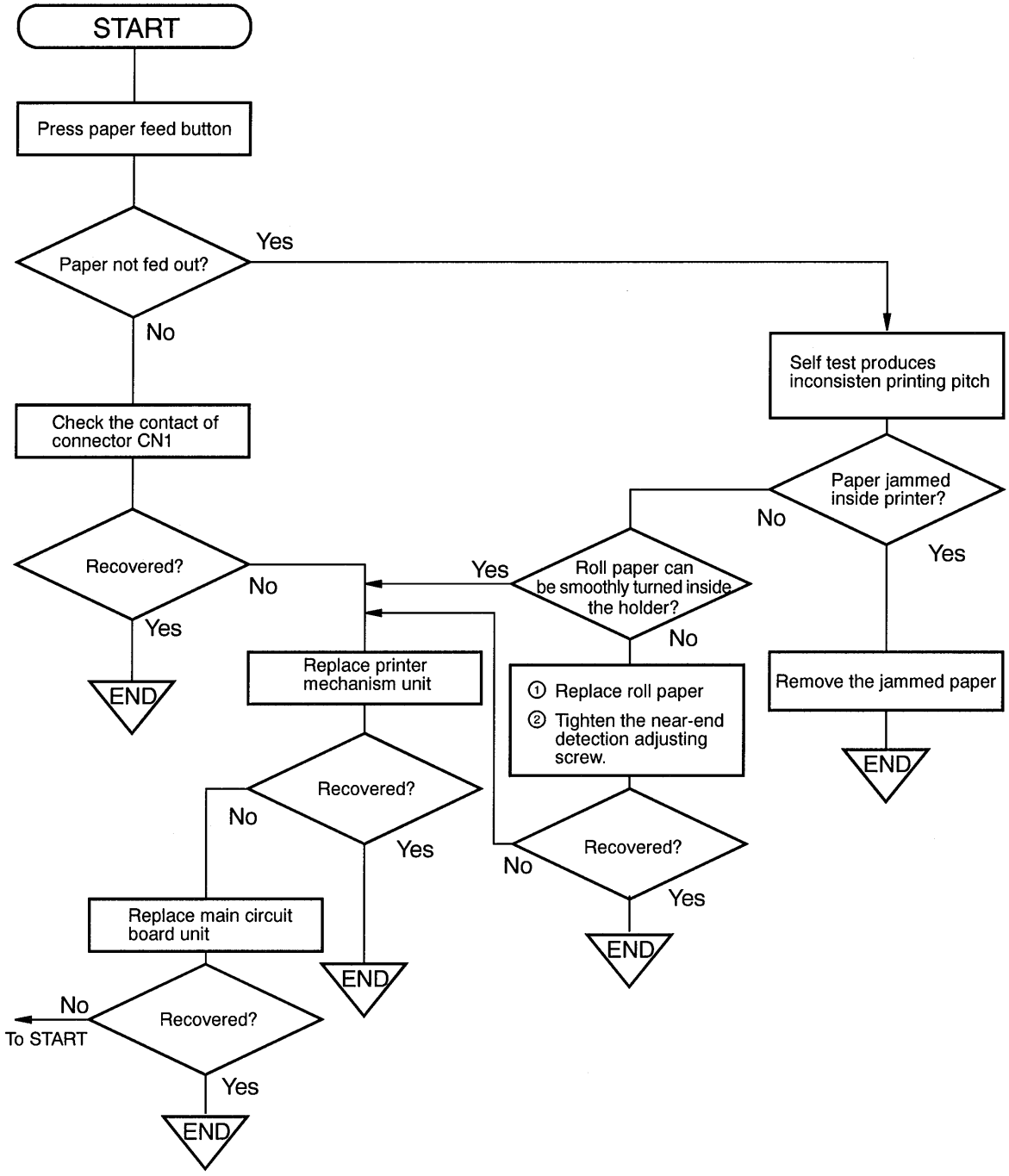
4.2.1 If No Operation Takes Place Upon Turning ON Power Supply



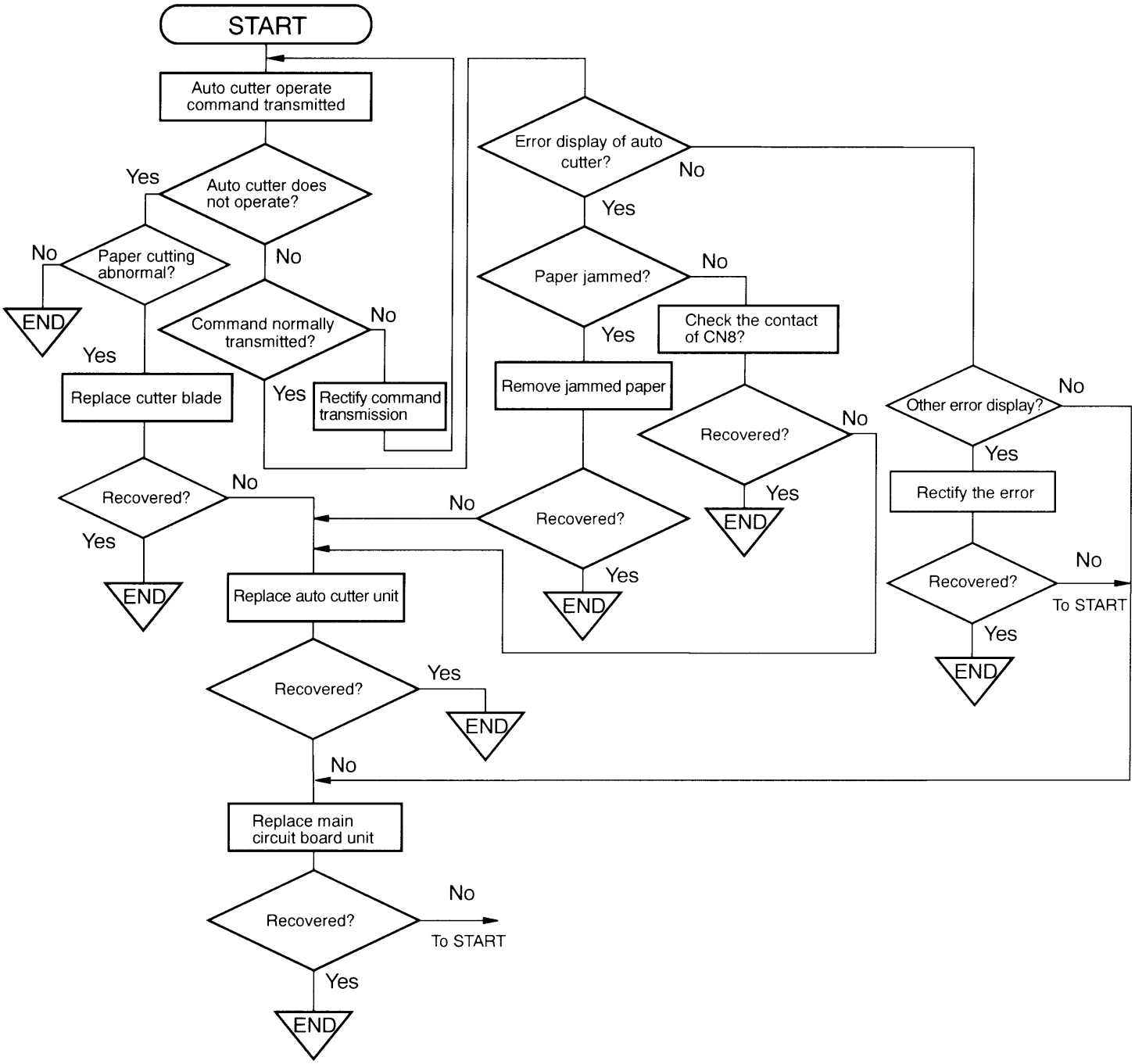
4.2.2 If Operation Takes Place, But Printing Error Occurs



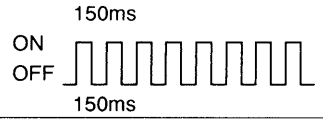
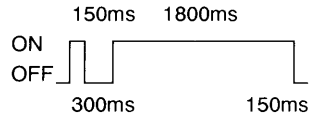
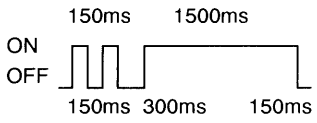
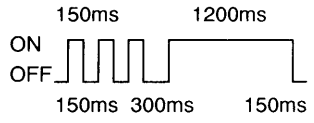
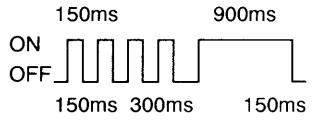
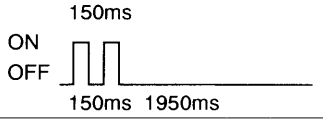
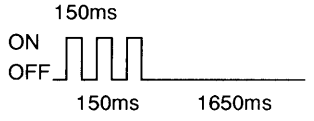
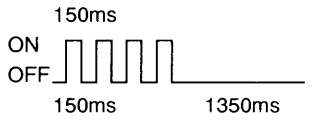
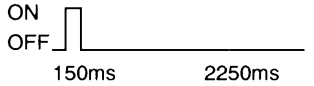
4.2.3 If Paper Feeding Is Abnormal



4.2.4 If Auto Cutter Malfunctions (When Mounted)



4.3 REMEDY IN CASE OF ERROR DISPLAY

Error	Flickering pattern	Recovery condition	Repairs
RAM Check error		Recovery impossible	● Replace the main circuit board unit (RAM is destroyed).
Transistor faulty error		Recovery impossible	● Replace the main circuit board unit (conductance of driver, Q_5, Q_6, UD_1 is destroyed).
Power supply voltage, high voltage error		Recovery impossible (power supply needs to be checked).	● Replace the power source, if its voltage is outside 24V ± 7%. ● Replace the main circuit board unit, if the power source is OK.
Power supply voltage, low voltage error		Recovery impossible (power supply needs to be checked).	● Replace the power source, if its voltage is outside 24V ± 7%. ● Replace the main circuit board unit, if the power source is OK.
Head thermistor error		Recovery impossible	● Replace the printer mechanism unit. ● Replace the main circuit board unit, if the printer mechanism unit replacement results in NG.
Internal data processing error		Recovered by cutting off and resuming the power supply again.	
No head paper error		Recovered by inserting paper and closing the cover.	● Replace the printer mechanism unit, if paper insertion results in NG. ● Replace the main circuit board unit, if the printer mechanism unit replacement results in NG.
Head overheat error		Recovered automatically by lowering down the temp of head.	● Replace the printer mechanism unit, if cooling down (to about 50°C) the head results in NG. ● Replace the main circuit board unit, if the printer mechanism unit replacement results in NG.
Auto cutter error		Recovered by cutting off the power supply, removing the jammed paper, and turning ON the power supply again.	● Replace the auto cutter unit, if removal of jammed paper results in NG. ● Replace the main circuit board unit, if replacement of the auto cutter unit results in NG.

4.4 AUTO CUTTER REPAIRS

Repair tasks of the auto cutter have been ranked into two levels, A and B, according to their intricacy. The personnel in charge of repairs should ensure that repairs are entrusted to technicians having appropriate technical skills.

4.4.1 Repair Levels

Level A : This requires a general knowledge of the basic principles and construction of the auto cutter, and technical skill, but does not require any particular experience in repairs.

Level B : This requires a thorough knowledge of the basic principles and construction of the auto cutter, and technical skill, as well as practical experience in repairs.

4.4.2 Repair Procedures

If the auto cutter develops any trouble, check the symptoms and its condition, locate the cause of the trouble according to the instructions given in 4.4.3 "Repair Guidelines", and then rectify the trouble. The repair guidelines in 4.4.3 comprise the following 5 areas. They enable efficient repairs without mistakes.

Phenomenon
Check the symptoms of trouble.
Condition
See if the condition of the auto cutter matches the condition in this column.
Cause
The causes are listed according to the condition of trouble. Verify whether cause lies. The repair level of each cause is also listed for reference purpose.
Checking point and checking method
This column explains how to locate the trouble point. Check according to the instructions in this column.
Repair method
Repair the trouble according to the instructions in this column. If the same trouble persists after repair, check other items given in the Cause column, and repair again.

- To slowly check the operation of cutter blade which is interlocked with several gears, manually turn the deceleration gear A, while ensuring that it does not get disengaged from the gears of slider ass'y.
- To simplify the identification and rectification of troubles, refer to the timing chart of auto cutter in Chapter 6 "Appendix".

4.4.3 Repair Guidelines

Phenomenon	Condition	Cause	Level	Checking location and checking method	Repair method
1. Motor does not run.	Cut command fails to run the motor.	(1) Faulty input to the motor	B	● Check the voltage of motor terminal. Rating : 24V ± 10% ● Remember that it is a forward/reverse running motor.	● Repair the motor drive control circuit, if the voltage is not within the rated range.
		(2) Faulty motor	B	● Dismount the motor, apply 24V to its power terminal, and check whether it runs.	● Replace the motor, if it does not run.
		(3) Snapped wire or improper soldering somewhere between the connector and motor	B	● Check the conductance between the terminals. ● Check the soldering.	● If there is no conductance, replace the connector sub ass'y. ● Resolder the faulty soldered point.
2. Cutter blade does not operate.	Motor runs, but the cutter blade does not operate.	Check for damaged or disengaged gears.	A	● Check the operation of cutter blade by manually turning the motor gear or deceleration gear A.	● Replace damaged gears, if any. ● Re-engage the disengaged gears, if any.
3. No full cut	Cutter blade operates, but does not make a full cut.	(1) Faulty output signals	B	● Check the output signals of the terminals of contact holder sub ass'y, using an oscilloscope. Lead wires: Brown : F/P position pulse White : Reset pulse Blue : Common	● Replace the contact holder sub ass'y and slider ass'y, if abnormal chattering (pulse width: 2ms or more) is generated in the signals. (Generated at point C of the full cut F/P position pulse given in timing chart.) ● Remove the paper dust from the pattern of slider ass'y.
		(2) Foreign matter adhering on the sliding part of cutter blade.	B	● Manually turn and check the rotation of deceleration gear A.	● If hard to turn or dragging, remove the cutter frame sub ass'y and clean it of impurities.
		(3) Damaged or worn out gears.	B	● Check for damaged or worn out gears.	● Remove the damaged or worn out gears, if any.
		(4) Faulty recording paper	B	● Check if prescribed paper is being used.	● Use prescribed paper.

CHAPTER 5

HANDLING, INSPECTION, AND MAINTENANCE

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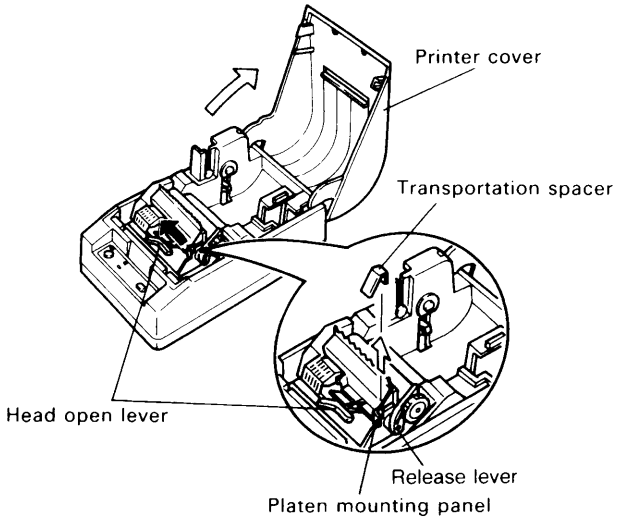
5.1 HANDLING

5.1.1 Handling During Installation

When the device shipped from factory, a transportation spacer is inserted between the platen frame and platen mounting panel on the side of release lever to prevent their direct close contact. Remove the spacer before using the device according to the following procedure.

① Open the printer cover. If auto cutter has been mounted, raise it, release the pressure on head by moving the head open lever in the direction of the arrow ➡ of Figure 5.1, and take out the orange spacer.



<When auto cutter is mounted>

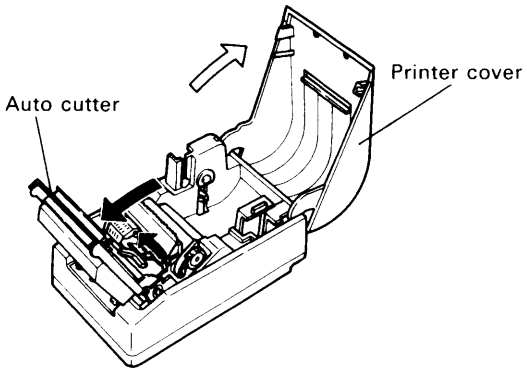


Figure 5.1

② Store the removed spacer in its container, as shown in Figure 5.2.

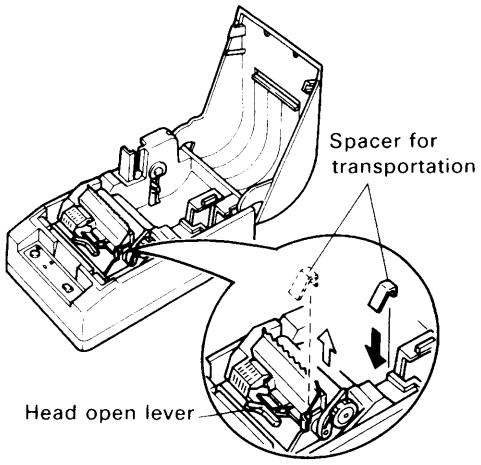


Figure 5.2

③ Move the head open lever in the direction of the arrow ➡ of Figure 5.3 to contact the head and platen closely each other. If auto cutter has been mounted, fell it down on the paper feeding side.

④ Close the printer cover.

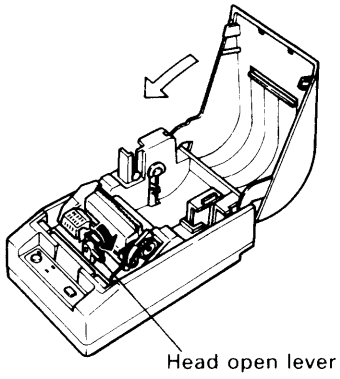


Figure 5.3

Note: If the device is to remain idle for a long period of time, insert the spacer between the printer platen and platen mounting panel on the side of release lever.

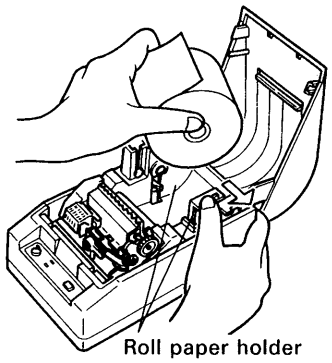
5.1.2 Cautions on Handling the Printer Mechanism

- Do not turn the paper-feed knob, while in head down state.
- Do not pull out (forward/reverse) the paper, while in head down state.
- Never touch the head heating element and driver IC with any metallic or hard objects, because they are very susceptible to damage.
- **Do not touch the head vicinity and motor surface with bare hands while printing and immediately after printing, because they are hot.**
- Do not operate the head open lever, except when necessary.
- Never touch the head heating element with hands (because it may be contaminated, inflicting adverse effect).
- Do not leave the printer standing, with its platen and head in direct contact with each other.

5.1.3 Cautions on Paper

- Use only the prescribed paper, because if the thermal paper contains ions of Na, K, Cl, etc, it will inflict adverse effect on head heating element.
- Be careful of the effect of heat, moisture, light, etc on both the unused and recorded paper, because the paper colors about above 70°C.
  (a) Do not store the paper at places of high temperature and high humidity. (such as near a heating equipment during winter or sealed containers under sunlight during summer).
  (b) Do not store the paper under direct sunlight. Because the color may change or the recording portion may undergo discoloration.
- During high temperature and high humidity environment, do not allow the paper to remain caught up

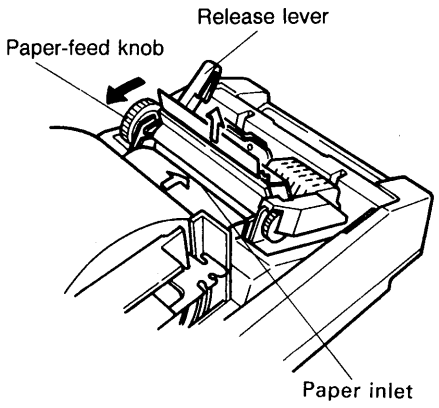
③ Holding the right side of roll paper holder opened (outward) slightly, install the roll paper. Release the roll paper holder, after inserting the core of roll paper into its slot.



Roll paper holder

④ Insert the leading edge of the paper into its inlet, and turn the paper-feed knob in the direction of the arrow (Figure 5.7), until the paper comes out about 5cm beyond the cutter blade.

Note: Do not turn the paper-feed knob, while the release lever is down.



<When auto cutter is mounted>

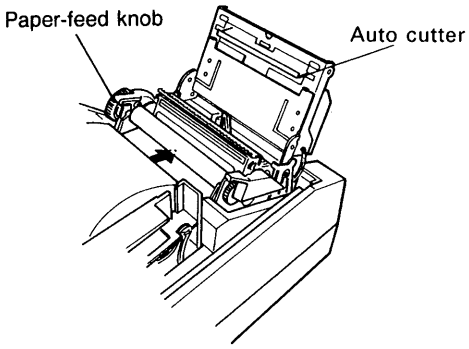
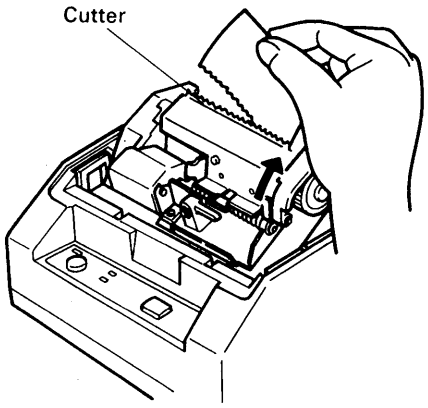


Figure 5.7

⑤ Bring the leading edge of the paper against the roll paper, and make the paper straight (by gently stretching the left/right sides of the paper on the roll, to straighten out any slackening).

⑥ Move the release lever in the direction of the arrow (see Figure 5.8) and cut off the extra paper. If auto cutter has been mounted, fell it.



<When auto cutter is mounted>

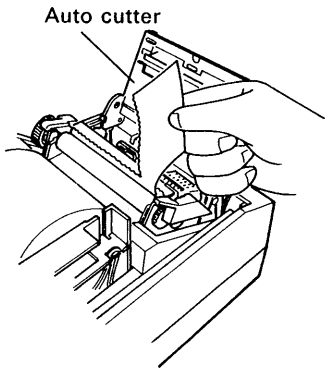


Figure 5.8

⑦ Close the printer cover.
If auto cutter has been mounted, turn ON the power button, and make sure that the paper is normally fed out by pressing the paper feed button.

5.1.5 Adjusting the Residual Amount of Roll Paper

Check the inner and outer diameter of roll paper's core at the time of installing the product, because the residual amout of roll paper differs with them.
To adjust the minimum residual amount, loosen the adjusting screw which retains the detecotor (see Figure 5.9), bring the upper edge of positioning panel at the desired adjustment scale reading, and fasten the adjusting screw.

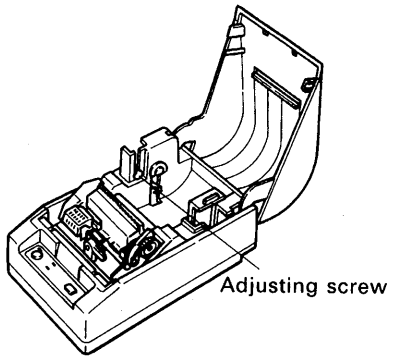


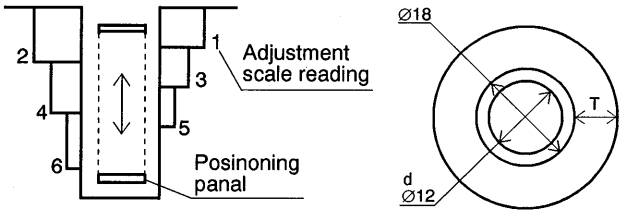
Figure 5.9

<Example>
The minimum residual amount of the roll paper, under the following presumed conditions, are as given below.

① Core diameter ϕ d 12mm, outer diameter 18mm (see the following diagram)
② CASIO prescribed paper

(Minimum residual amount)

Adjustment scale reading	Dimension T (mm)
#1	About 0
#2	About 2
#3	About 4
#4	About 6
#5	About 8
#6	About 10



5.1.6 Cautions on Handling the Auto Cutter (Option)

Cautions on transportation

- Do not hold the connector sub ass'y or cutter cover, while carrying the auto cutter independently.
- Do not inflict external stress or shocks on the device, such as, by dropping, hitting, etc.

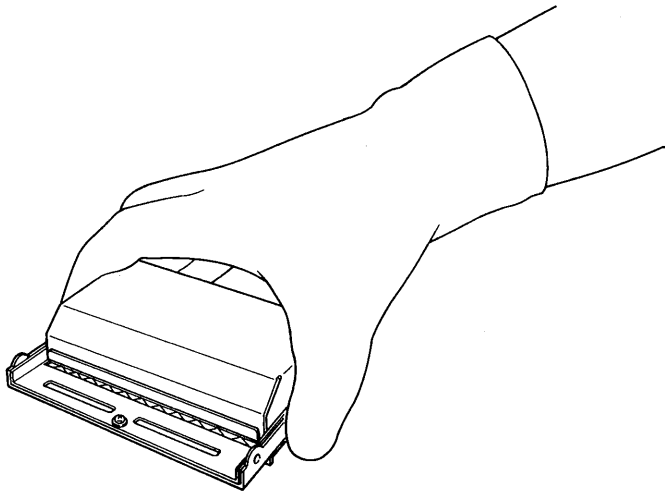


Figure 5.10 Proper holding method

Cautions on storage

- Do not store the auto cutter at places subject to severe dust, dirt, direct sunlight, high humidity, etc.
- When storing the auto cutter for a prolonged time, place it in a polyethylene bag, together with rust-preventive paper (VCI paper), and store it at a dry location.

Cautions on use

- Do not use the printer at places where there is substantial amount of iron powder, dirt, dust, etc, because the printer employs permanent magnets.

5.2 INSPECTION AND MAINTENANCE

Execute the following inspection and maintenance to retain the initial performance of this machine over a prolonged period and to forestall impending troubles.

5.2.1 Inspection

The inspection of this printer are divided into daily checks, which can be carried out easily by whoever uses the printer, and periodic checks, which require knowledge about the printer. So, assign these tasks to the respective personnel having needed expertise.

Daily Checks

Confirm that the printer is being kept in its optimum condition by following the detailed instructions given in 5.11 "Handling".

Periodic Checks

Carry out the following inspection every 2 to 3 month.

No.	Check item	Standard	Remedy
1	Adhesion of dirt, lint, dust, or foreign objects on various parts.	● Conspicuous amount of dirt, lint, dust, or foreign objects must not be adhering on the operating parts. ● When auto cutter has been mounted, conspicuous amount of dirt, lint, dust, or foreign objects must not be adhering on the detector (detection circuit board of slider ass'y and contact of contact holder sub ass'y).	● Thoroughly clean all the parts with a vacuum cleaner. ● Remove the cutter cover, wipe off the detector with alcohol, and thoroughly clean other parts with a vacuum cleaner (paying attention not deform the contact).
2	Operation check	● Print operation must be normal. ● Paper feed operation must be normal. ● Monitoring of various functions must reveal normal wear, deformation, bends, etc. on any parts. ● Cutting operation must be normal.	● See Chapter 4 "Troubleshooting".
3	Oil level check	● See 5.2.3 "Lubrication and Adhesion".	● Lubricate, referring to 6.9 "Comprehensive lubrication and adhesion diagram" in Chapter 6.

5.2.2 Maintenance

Head Cleaning

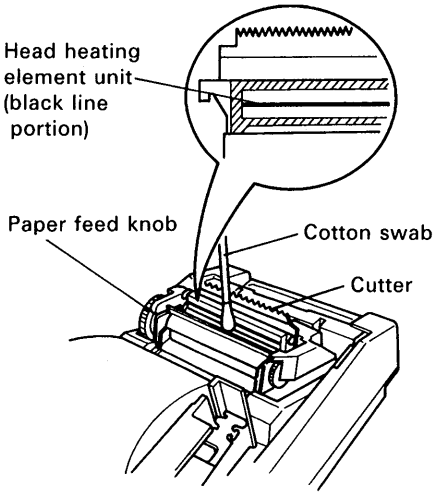
Clean the head as follows:

<Step 1>

Open the printer cover, and raise the head open lever. If auto cutter has been mounted, raise it at first, and then the head open lever. If roll paper has been installed, draw it out from the head.

<Step 2>

Wipe the head heating element with a cotton swab moistened in some alcohol family solvent (ethanol, methanol, IPA, etc).



<When auto cutter is mounted>

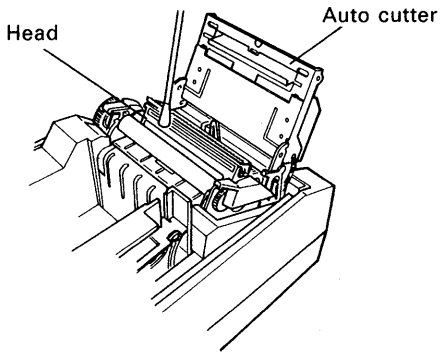


Figure 5.11

<Step 3>

After the alcohol family solvent has fully evaporated, fell the head open lever. If auto cutter has been mounted, fell the head open lever at first, and then the auto cutter. Next, install the roll paper again, (see 5.1.4 "Installing roll paper"), and close the printer cover.

Note: Never touch the head with fingers.

Other Cleaning

<Cleaning off dirt>

Wipe off the dirt using clean dry cloth. If the dirt cannot be wiped off, use a neutral detergent.

<Cleaning off dirt, fluff, and dust>

Preferably use a vacuum cleaner for cleaning purpose. Remove all the adhering dirt, fluff, and dust by cleaning thoroughly.

Note: Never use alcohol, thinner, toluene, or ketone family solvents, because they are likely to deform or damage plastic and rubber parts.

5.2.3 Lubrication and Adhesion

Lubrication and adhesion are important to maintain the initial performance of the printer for a long time and to prevent troubles. Therefore, the prescribed lubricants and adhesives must be applied at prescribed intervals, in appropriate amounts.

Lubrication Standards

- When lubricating during disassembly and assembly, clean the lubricating part thoroughly at first.
- Always lubricate after disassembly and replacement, as well as when cleaning decreases the lubricant.
- Lubricate the auto cutter (option) every 2 years or after every 200,000 cuts.

Lubricants Types

Two types of lubricants, G-36 and G-14 are used on this printer. CASIO supplies these lubricants in 40cc (gr) plastic cans.

Lubrication Points

The following is the lubrication points.

No.	Lubrication point	Lubricant
(1)	The 2 joints of near-end detection lever of the near-end detection frame	G-36
(2)	The sliding area between the deceleration gear B and deceleration gear shaft C of cutter frame sub ass'y	G-14
(3)	The sliding area between the deceleration gear A and deceleration gear shaft A of cutter frame sub ass'y	G-14
(4)	The sliding area between the deceleration gear A and deceleration gear shaft B of cutter frame sub ass'y	G-14
(5)	The 4 joints of cutter mounting plate and cutter unit desk	G-36

Note 1: The numbers in the above table are identical to the numbers in the comprehensive lubrication and abhesion diagram in Chapter 6 "Appendix".

Note 2: The amount of lubrication at each point shall be just equivalent to that applied with a brush.

Adhesion Standards

Some parts of this printer are fastened with an adhesive. Therefore, apply the prescribed adhesive to the prescribed points when reassembling or replacing the parts.

Adhesive Agents

Only one adhesive agent Locktite green screw lock is used for this printer.

Adhering Points

The following is the adhering points.

No.	Adhesive coating point	Type
(6)	Retaining screws of the near-end detection frame and near-end detector	Locktite green screw lock
(7) (8)	Retaining screw section of the micro switch of sensor mounting plate, and its screws	Locktite green screw lock

Note:

The numbers in the above table are identical to the numbers in the comprehensive lubrication and adhesion diagram in Chapter 6 "Appendix".

CHAPTER 6

APPENDIX

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6.1 TOOLS LIST

No.	Tool name	Commercially available
1	Precision screw driver (+) No.1	○
2	Brush #1	○
3	Washing brush	○
4	Tweezers	○
5	Slanted blade cutters	○
6	Electric soldering iron	○
7	Clearance gauge 0.1mm	Ⓢ
8	ET holder #1.5	○
9	Press-fitting jig (for drive gear)	Ⓢ

○ General commercial product
Ⓢ CASIO product

6.2 LUBRICANTS LIST

Type	Name	Amount	Commercially available
Oil	G-14	40gr	Ⓢ
Oil	G-36	40gr	Ⓢ

○ General commercial product
Ⓢ CASIO product

6.3 ADHESIVE AGENTS LIST

Name	Commarcially Available
Locktite Green Screw Lock	○

○ General commercial product
Ⓢ CASIO product

6.4 ELECTRICAL COMPONENTS LIST

Main Circuit Board Unit

Part name	Name	Standard	Address	Cautions
CPU	μPD70325GJ-10-5BG	V251, 10MHz, QFP	UA1	
S-RAM	TC51832FL-10	256K, SOP, 100nS, FLAT	UB1	
Gate array	E05M19CA	80Pin, QFP	UC1	CASIOproduct
Transistor array	TA8428K	30V, 3A, 1.25W	UD1	With auto cutter
IC	STA401A	50V, 4A, 20W	UE1	
Comparator	PST572-CMT	Reset IC, 4.5V detector, TP	UB2	
Linear IC	SI-820IL	5V, 400MW	REG1	
C-MOS	TC7S32F-TE85L	OR GATE, 1 circuit	U88	Parallel I/F
IC	μPD4711AGS-E2	RS-232C Driver	U102	Serial I/F
TTL	SN74LSO7NS-TPL	OPEN-CORRECTOR, FLAT, TP	UB4	
TTL	SN74LSO7NS-TPL	OPEN-CORRECTOR, FLAT, TP	UB3	
Ceramic oscillator	CST6. 00MGW	6MHz, condenser built in	CR1	
Ceramic oscillator	CSA20. 0MX040	20MHz	CR2	
Transistor	2SJ138	100V, 12A	Q2	
NPN Transistor	2SD 1584-Z-T1	60V, 3A, 10W, SMT	Q5, Q6	
NPN Transistor	DTC143EK-T146	50V, 100mA, 200mW, 4.7K, TP	Q3, Q4	
PNP Transistor	DTA124EK-T96	50V, 100mA, 200mW, 22K, 22K, TP	Q1	

Main Circuit Board Unit *(Continued)*

Part name	Name	Standard	Address	Cautions
PNP Transistor	2SB1449S-MGS	50V, 5A, 30W, SMT	Q7	
Diode	DCC010-TB	80V, 300mA, TP	D1, D2	
			D3, D4	With auto cutter
Diode	DSA010-TB	80V, 300mA, TP	D5, D12	
Diode	DSM10C-TL	200V, 1A, TP	D6, D7, D8, D9, D10	
IC Socket	DILB-32P-8JK	32Pin	UA2	With kanji
IC Socket	DILB-28P-8JK	28Pin	UA2	Without kanji
Commonchoke coil	SJF431214A	15μH, 75mOHM	L1	
Coil	BLM21B03PT	0.2Ω, TP	L2, L3, L6, L7	
Fuse	SSFR-6.3-NJ (F003)	6.3A, 125V, F003 version	F1	
Connector	53047-0410	1.25mm, 4Pin, 1A	CN2	
Connector	53047-0310	1.25mm, 3Pin, 1A	CN6	
Connectr	TM5RJ3-66	6Pin	CN3	
Connector	5597-27CPB	1.25mm, 27Pin, 1A	CN9	
Connector	53047-0610	1.25mm, 6Pin, 1A	CN1	
Connector	TCS7960-53-2010	3Pin, 7.5A	CN4	
Connector	ADS-B36BLFDR176A	Amphenol 36 Pin	CN10	Parallel I/F
Connector	JBY-25S-1A3G	D-sub25Pin	CN5	Serial I/F
Connector	5045-05A	5Pin	CN8	With auto cutter
Chip laminated condenser	GRM40CH100D50PT	10pF, 50V, ±0.5pF, TP	C17, C18	
Chip laminated condenser	GRM40F104M50PT	0.1μF, 50V, ±20%, TP	C1~C6, C9~C12, C35, C41	
			C32	With auto cutter
Chip laminated condenser	GRM40F103Z50PT	0.01μF, 50V, +80%, −20%, TP	C13, C14, C19, C32	
			C29, C30	With auto cutter
Chip laminated condenser	GRM40B333M50PT	0.033μF, 50V, ±20%, TP	C25, C29, C30	With auto cutter
Chip laminated condenser	GRM40F102Z50PT	1000pF, 50V, +80%, −20%, TP	C36, C37, C38, C39	
Aluminum electrolytic condenser	UWX1A330MCR1GB	33μF, 10V, 20%, TP	C15, C23	
Aluminum electrolytic condenser	UUR1V330MBT1GS	33μF, 35V, 20%, TP	C22	
Aluminum electrolytic condenser	UVR1V332MRA	3300μF, 35V, 20%	C26	
Aluminum electrolytic condenser	UVR1A471MEA	470μF, 10V, 20%	C21	
Aluminum electrolytic condenser	UWX1C220MCR1GB	22μF, 16V, ±20%, TP	C27, C28, C33, C34	Serial I/F
Chip laminated condenser	GRM40CH471K50PT	470pF, 50V	C7, C8, C24	Parallel I/F
Film Condenser	ECQ-V1H473JZ	0.047μF, 50V, ±5%	C20	
Chip fuse resistance	RF73B2B010JT	1Ω, 1/8W, TP	R63	
			R64	With auto cutter
Chip fuse resistance	RF73B2A100JT	10Ω, 1/10W, TP	R74	
Chip fuse	CCP-2E25TP	1A, TP	F2	
Chip resistance	RK73K2AT0Ω	0Ω, 1/10W, TP	JP1	With auto cutter
			JP2	T80
			JP3	With auto cutter
			JP5, JP7	With kanji
			JP12	
Chip resistance	RK73K2ATP103J	10KΩ, 1/10W, ±5%, TP	R9, R21, R23, R67, R68, R71, R73	
Chip resistance	RK73H2ATP1003F	100KΩ, 1/10W, ±1%, TP	R10, R29, R31	
Chip resistance	RK73B2A104JT	100KΩ, 1/10W, ±5%, TP	R49	Serial I/F
Chip resistance	RK73K2ATP101J	100Ω, 1/10W, ±5%, TP	R6, R7, R60	
Chip resistance	RK73K2ATP272J	2.7KΩ, 1/10W, ±5%, TP	R36, R37	
Chip resistance	RK73K2ATP102J	1KΩ, 1/10W, ±5%, TP	R8, R20, R24, R33, R34, R39, R52, R53, R54, R65, R66	
Chip resistance	RK73K2ATP473J	47KΩ, 1/10W, ±5%, TP	R2~R5, R22, R27, R28, R70, R72	
			R62	Parallel I/F
			R75, R76	With auto cutter
Chip resistance	RK73K2ATP332J	3.3KΩ, 1/10W, ±5%, TP	R19, R61	
			R49, R50	Papallel I/F
Chip resistance	RK73H2ATP2002F	20KΩ, 1/10W, ±1%, TP	R30	

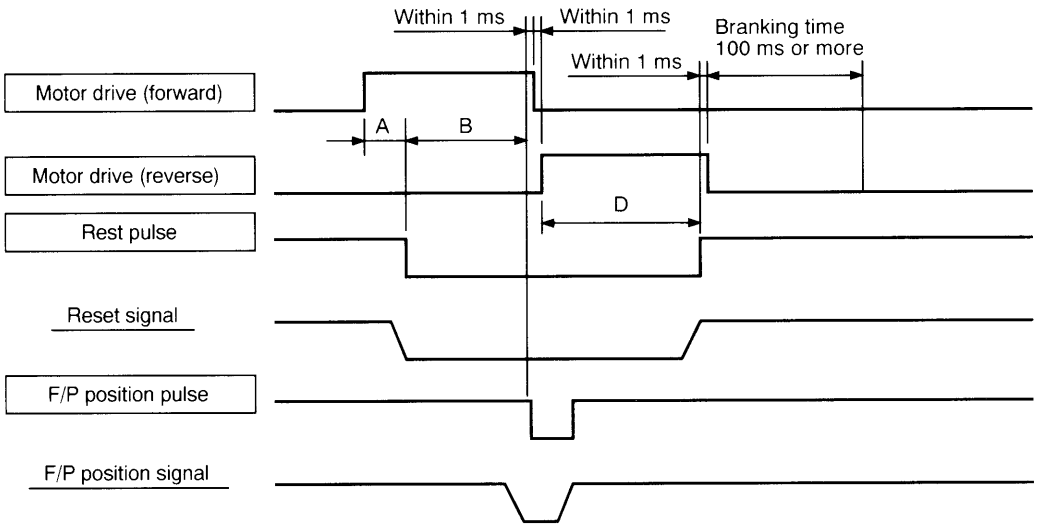
Main Circuit Board Unit *(Continued)*

Part name	Name	Standard	Address	Cautions
Chip resistance	RK73K2ATP510J	51Ω, 1/10W, ±5%, TP	R80, R81	
Chip resistance	RK73K2ATP472J	4.7KΩ, 1/10W, ±5%, TP	R16~R18, R47, R48, R77, R78, R79	
Chip resistance	RK73K2ATP333J	33KΩ, 1/10W, ±5%, TP	R1, R14	
Chip resistance	RK73K2ETP432J	4.3KΩ, 1/4W, ±5%, TP	R15	
Chip resistance	RK73K2ATP105J	1MΩ, 1/10W, ±5%, TP	R13	
Chip resistance	RK73K2ATP331J	330Ω, 1/10W, ±5%, TP	R40, R44~R46, R69	
Chip resistance	RK73K2ATP163J	16KΩ, 1/10W, ±5%, TP	R26	
Chip resistance	RK73H2ATP1803F	180KΩ, 1/10W, ±1%, TP	R38	
Chip resistance	RK73H2ATP5102F	51KΩ, 1/10W, ±1%, TP	R12	
Chip resistance	RK73H2ATP4023F	402KΩ, 1/10W, ±1%, TP	R11	
Chip resistance	RK73H2ATP1302F	13KΩ, 1/10W, ±1%, TP	R32	
Resistance array	EXB-R84472J	Parallel, 4P, 4.7KΩ, 1/8W, 5%	RM2	
Resistance array	CN2A8122JT	Independent, 8P, 1.2KΩ, 1/10W, 5%	RM8	
Resistance array	EXB-R84473J	Parallel, 4P, 47KΩ, 1/4W, 5%	RM1	
Resistance array	EXB-R88332J	Parallel, 8P, 3.3KΩ, 1/8W, 5%	RM7	
			RM9	Parallel I/F
Resistance array	EXB-R84104J	Parallel, 4P, 100KΩ, 1/4W, 5%	RM10	
Resistance array	CN2A8331JT	Independent, 8P, 330KΩ, 1/10W, 5%	RM3, RM4,RM5	
Resistance array	CN2A4331JT	Independent, 4P, 330KΩ, 1/10W, 5%	RM6, RM11, RM12	
Resistance array	EXB-R88104J	Parallel, 8P, 100KΩ, 1/8W, 5%	RM9	Serial I/F
Push switch	ESB641	24V, 0.2A	SW1	
Push switch	TKM-D1-H60	12V, 50mA	SW2	
Dip switch	KSS-05	5-Pin	DSW2	Parallel I/F
Dip switch	KSD-10	10-Pin	DSW1	Serial I/F
LED	SEL4226R	Red color	LED1, LED2	
LED	SEL4426G	Yellowish-green color	LED3	
LED Holder	LM-10	H=10mm	LED1, LED2, LED3	
EMI Filter	DSS306-55F223Z	22000pF, -20~180%, 16V	L10	
EMI Filter	BLM41A01PTM00-04	1A, TP	L11	
			L8, L9	With auto cutter
EMI Filter	BLM21A05PT	0.2A, TP	JP6	Without kanji
			JP15, L14	With kanji
			L12, L15	
EMI Filter	NFM41R00C101TI	100pF, TP	L4, L5	Serial I/F

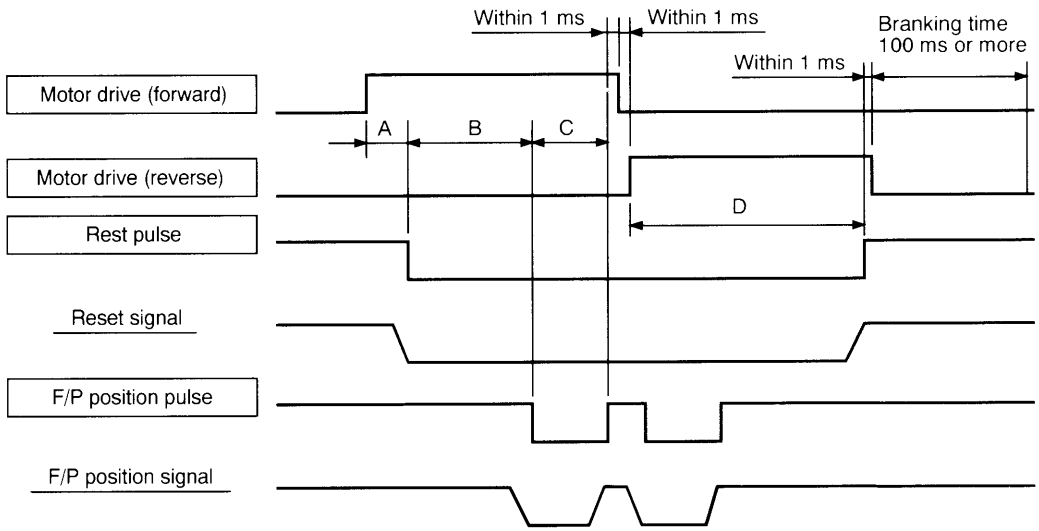
6.5 TIMING CHARTS

Timing Chart of Auto Cutter Unit

Partial cut



Full cut



Note: The time intervals of A, B, C and D in the above charts are set as follows to provide protection against locking of the motor.

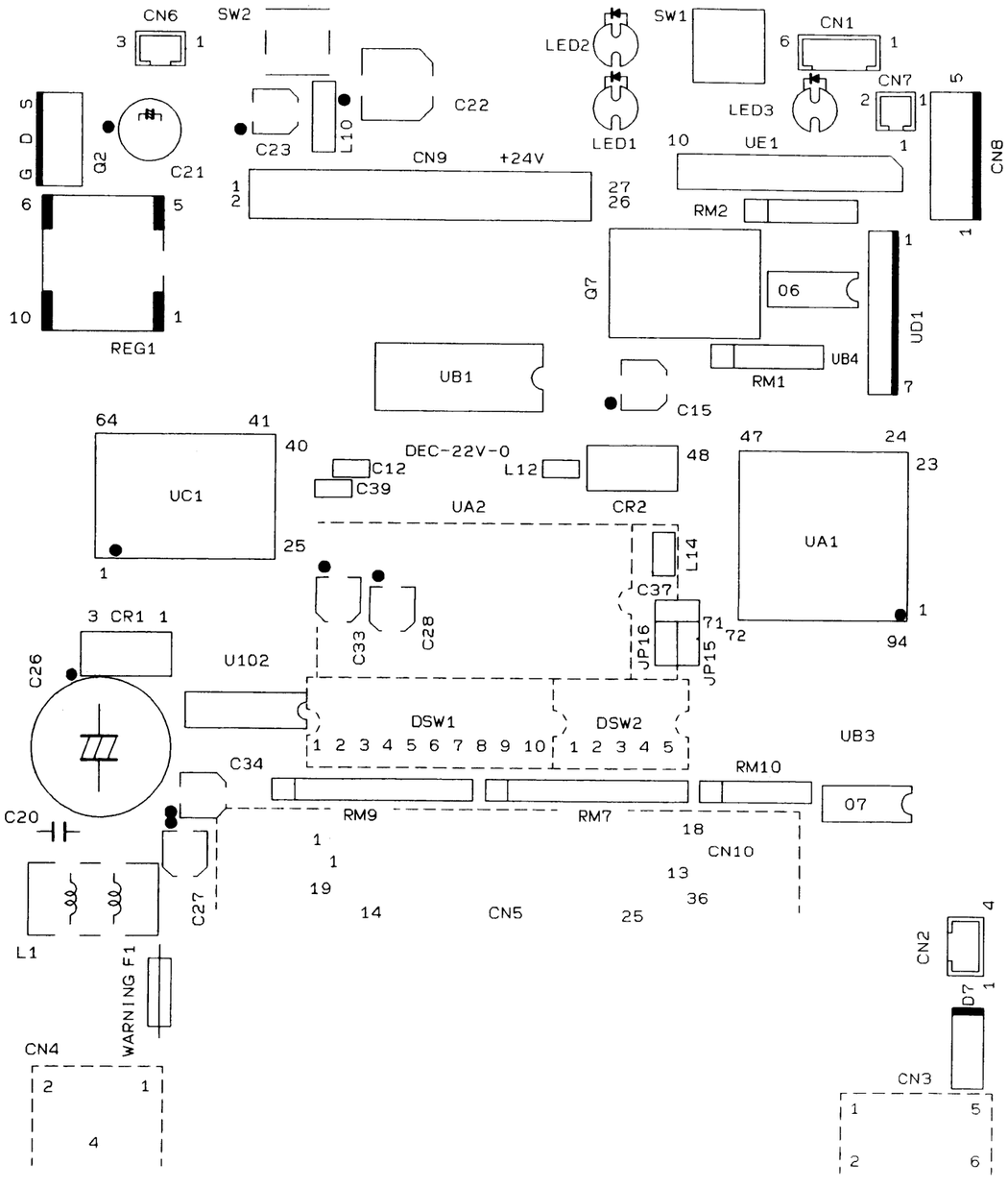
(1) If A ≧ 200 ms following the start-up of the cutter motor: Immediately cut off the charge to the cutter motor, perform reverse rotation, then promptly eliminate the external cause of the problem.

(2) If B ≧ 500 ms following the fall of Reset pulse: Immediately cut off the charge to the cutter motor, then perform reverse rotation to return the cutter blade to home position. Next, cut off the charge to the cutter and the printer's motor, then promptly eliminate the external cause of the problem.
At this time, if the lapsed time from the start of the cutter motor's reverse rotation until the rise of the Reset pulse equals D ≦ 500 ms, immediately cut off the charge to the cutter and printer's motor, then promptly eliminate the external cause of the problem. (During a full cut or partial cut)

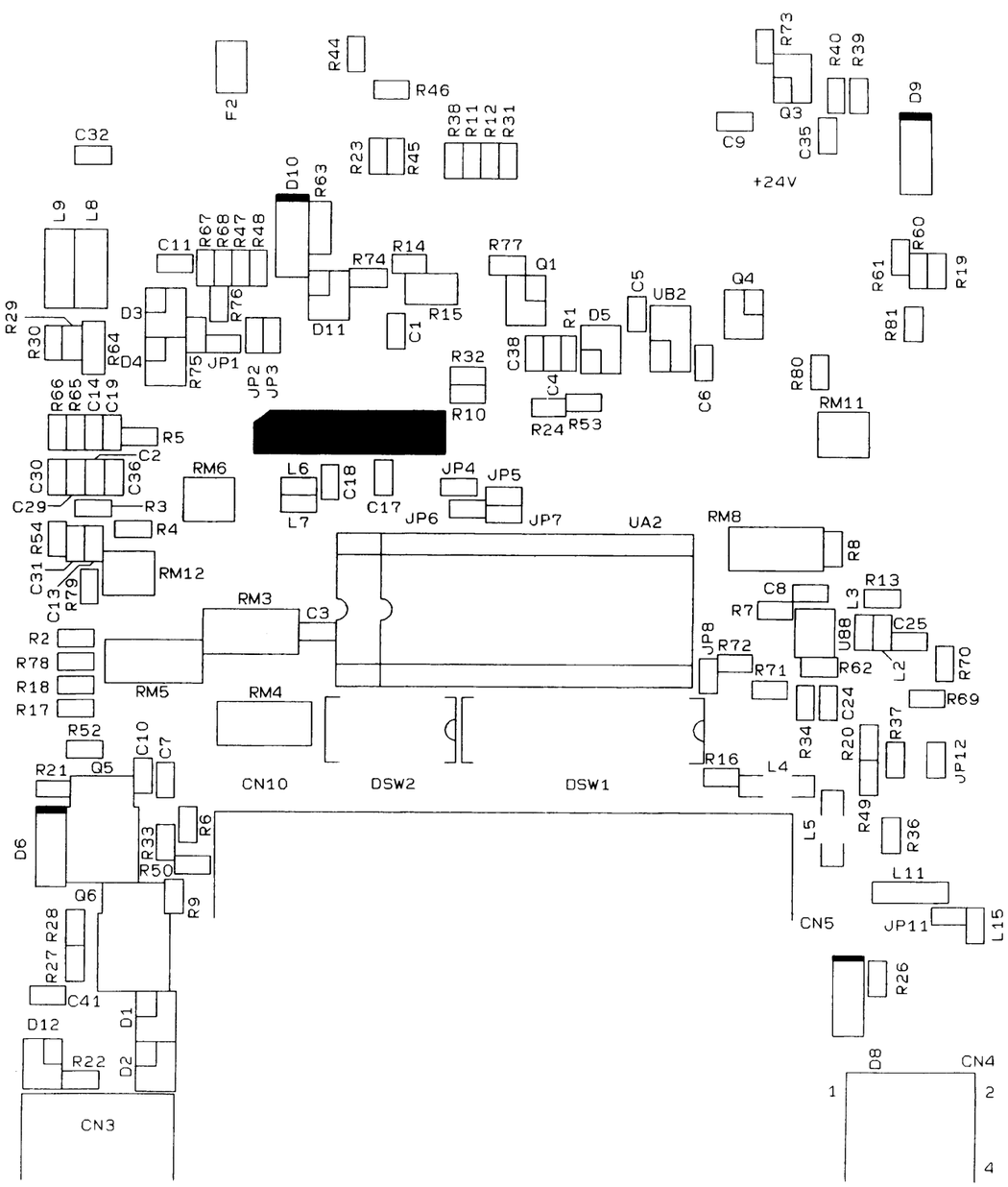
(3) If C ≦ 300 ms following the fall of the F/P Position pulse: Immediately cut off the charge to the cutter motor, perform reverse rotation to return the cutter blade to home position. Next, cut off the charge to the cutter and the printer's motor, then promptly eliminate the external cause of the problem.
At this time, if the lapsed time from the start of the cutter motor's reverse rotation until the rise of the Reset pulse equals D ≦ 500 ms, immediately cut off the charge to the cutter and printer's motor, then promptly eliminate the external cause of the problem. (During a full cut)

(4) If the lapsed time from the start of the cutter motor's reverse rotation until the rise of the Reset pule equals D ≧ 500 ms, immediately cut off the charge to the cutter and printer's motor, then promptly eliminate the external cause of the problem.

6.6 ELECTRICAL COMPONENTS LAYOUT

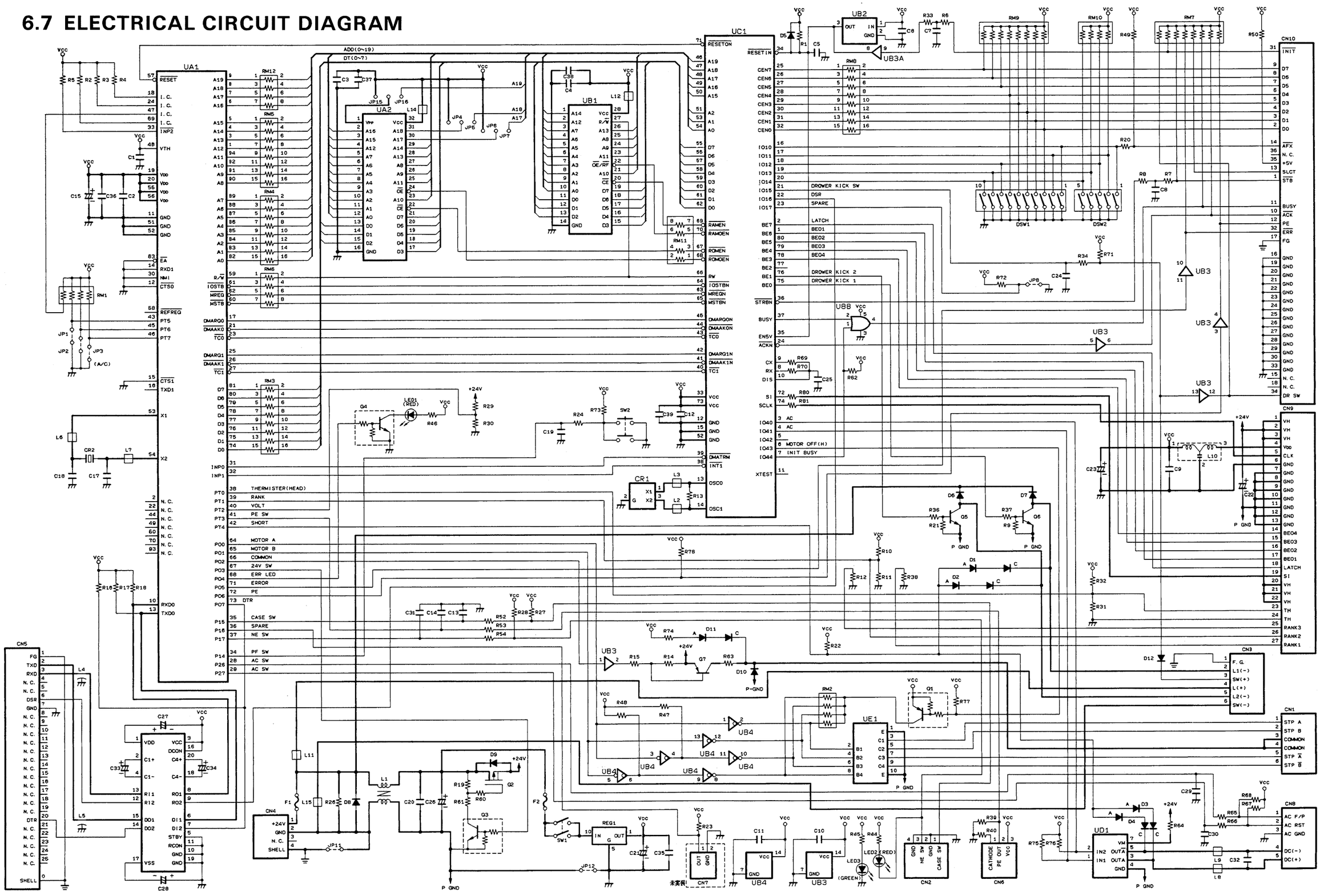


(A side)



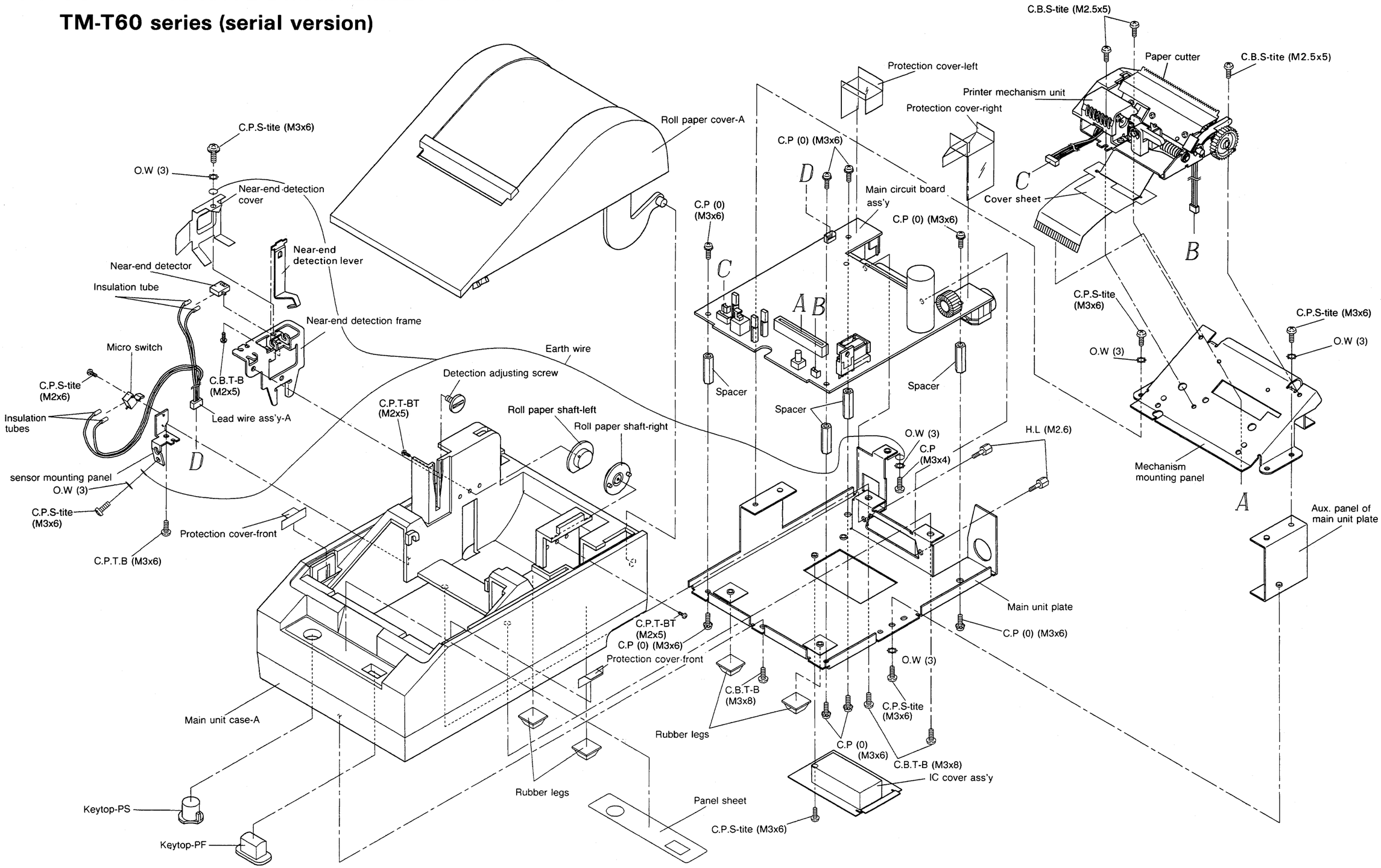
(B side)

6.7 ELECTRICAL CIRCUIT DIAGRAM

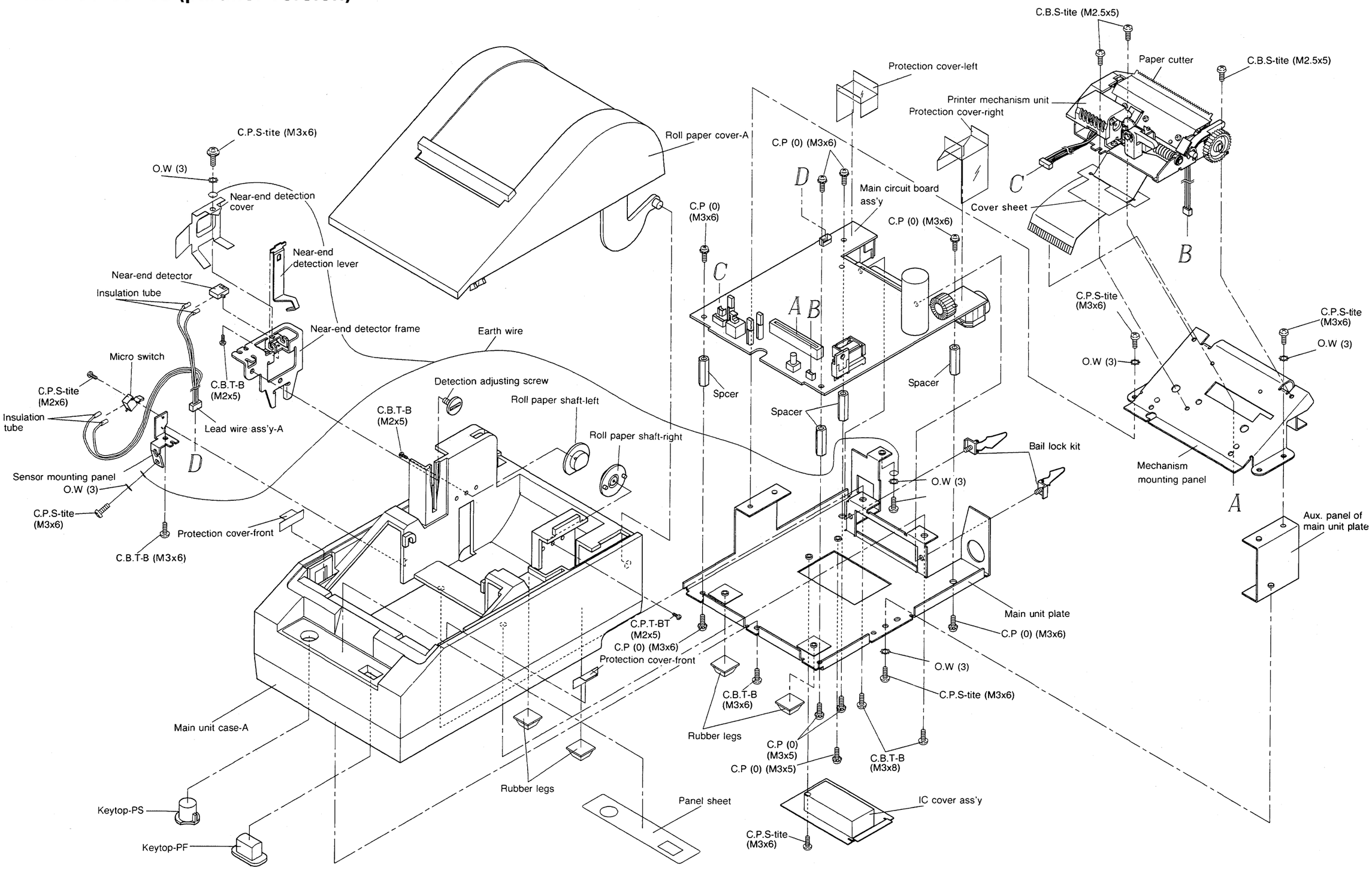


6.8 COMPREHENSIVE DISASSEMBLY DIAGRAMS

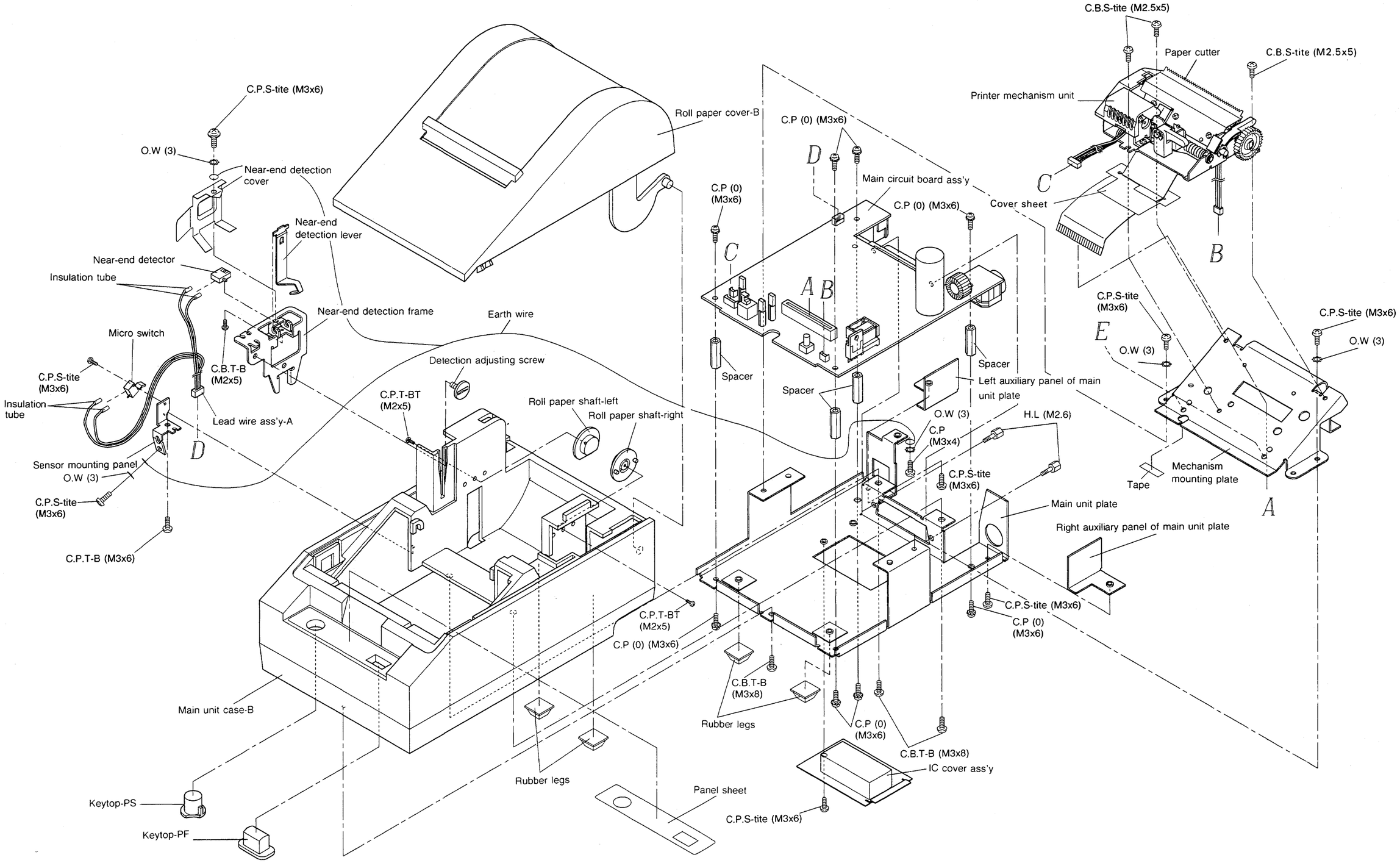
TM-T60 series (serial version)



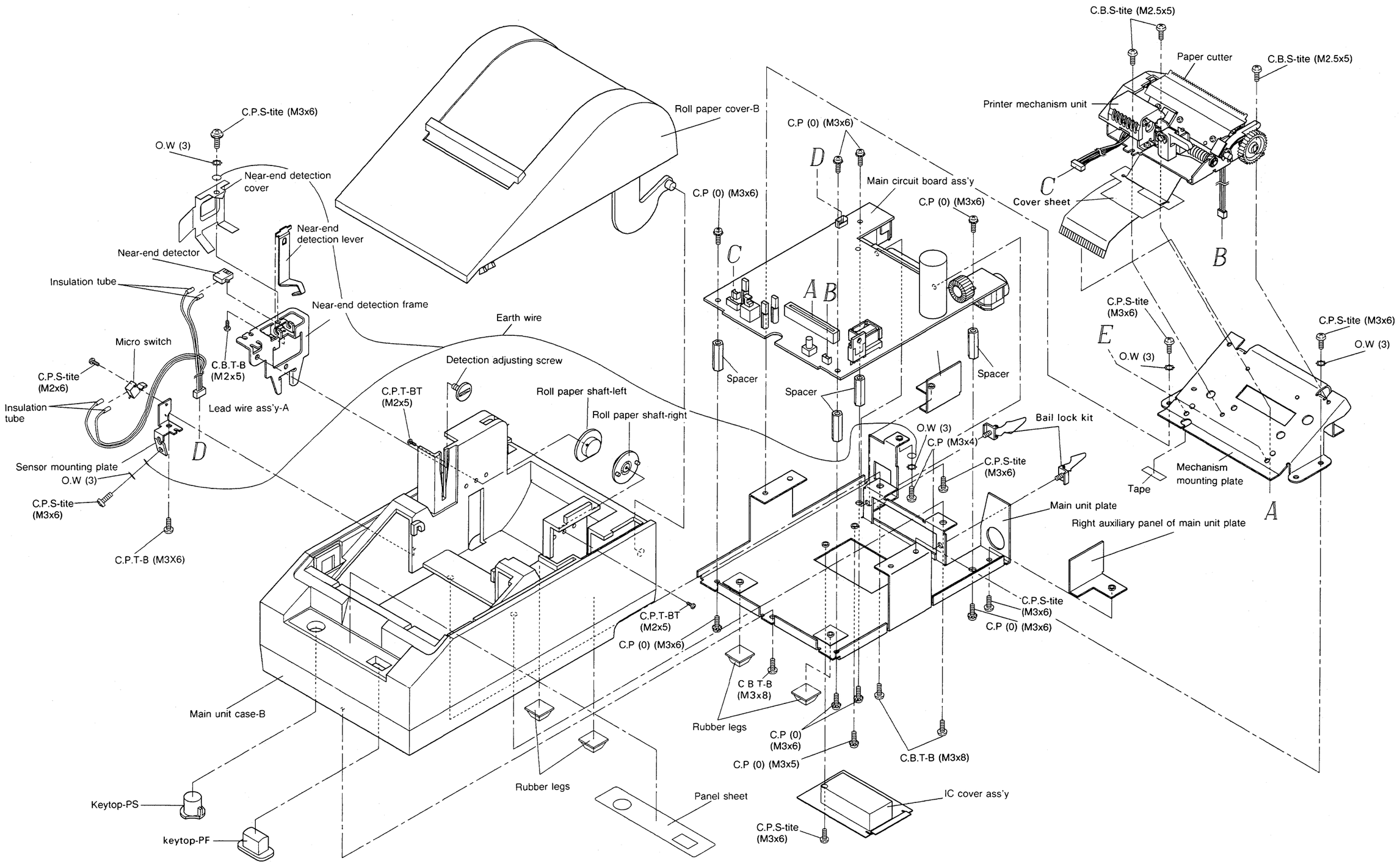
TM-T60 series (parallel version)



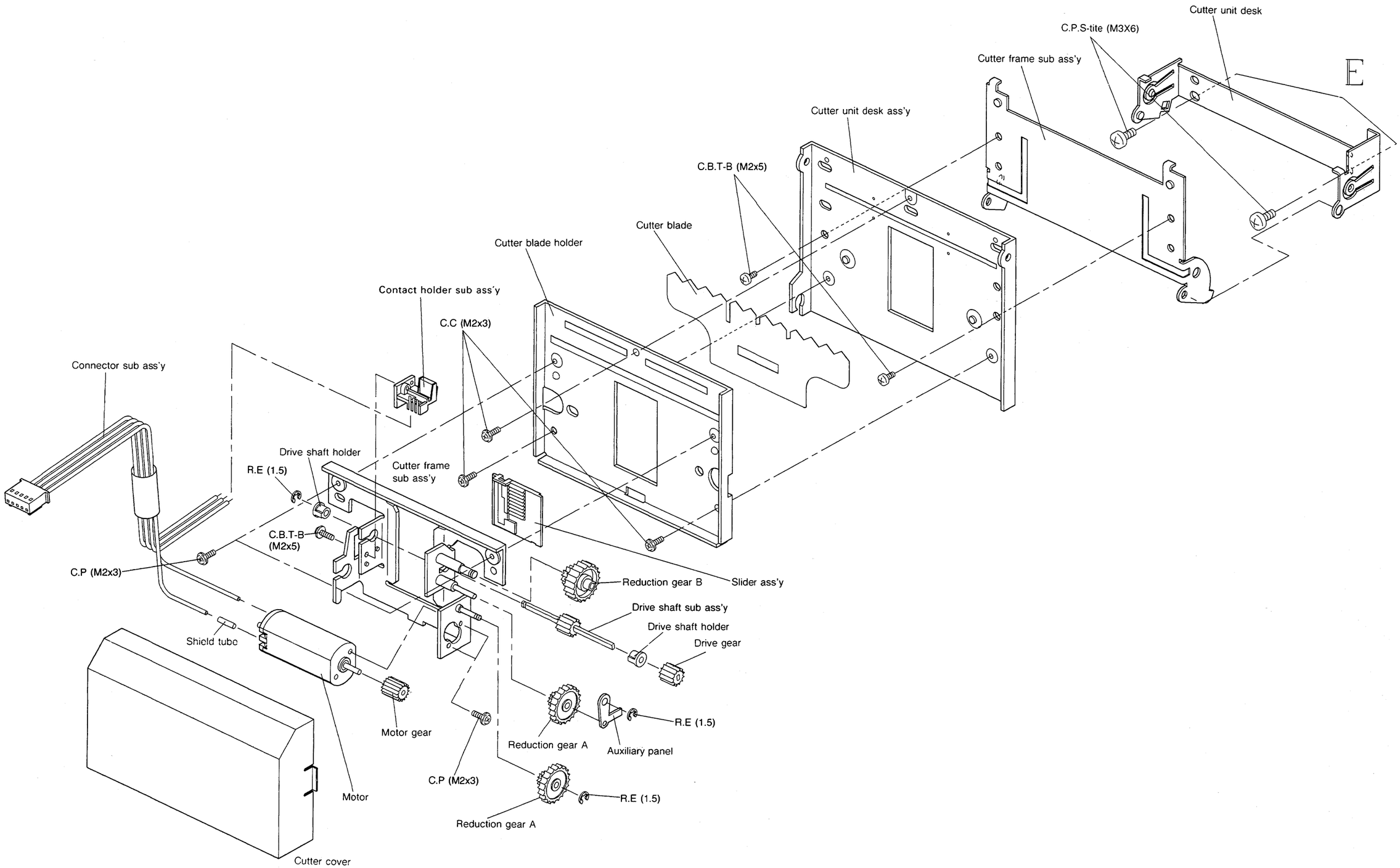
TM-T80 series (serial version)



TM-T80 series (parallel version)

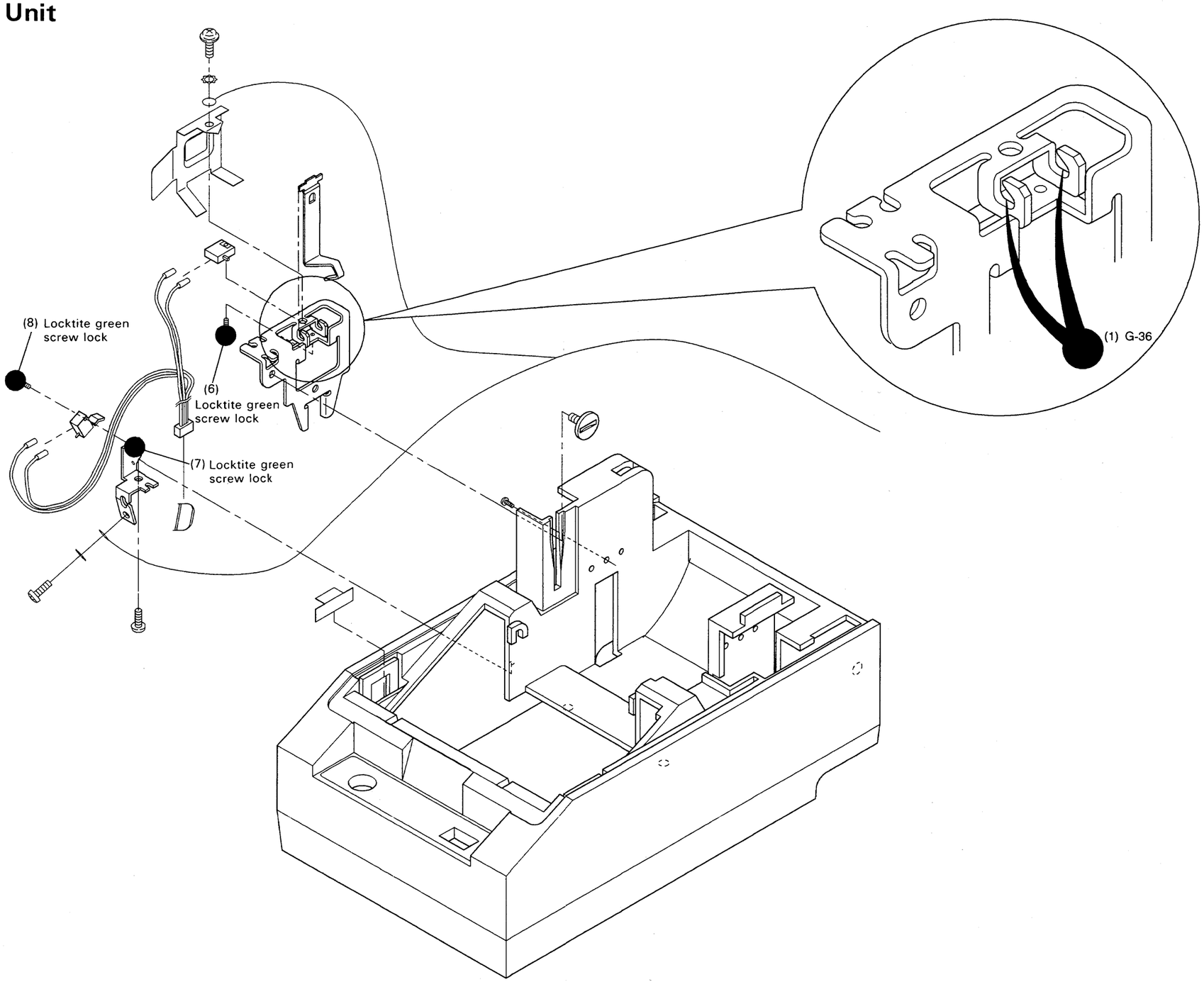


Auto Cutter Unit (Option)

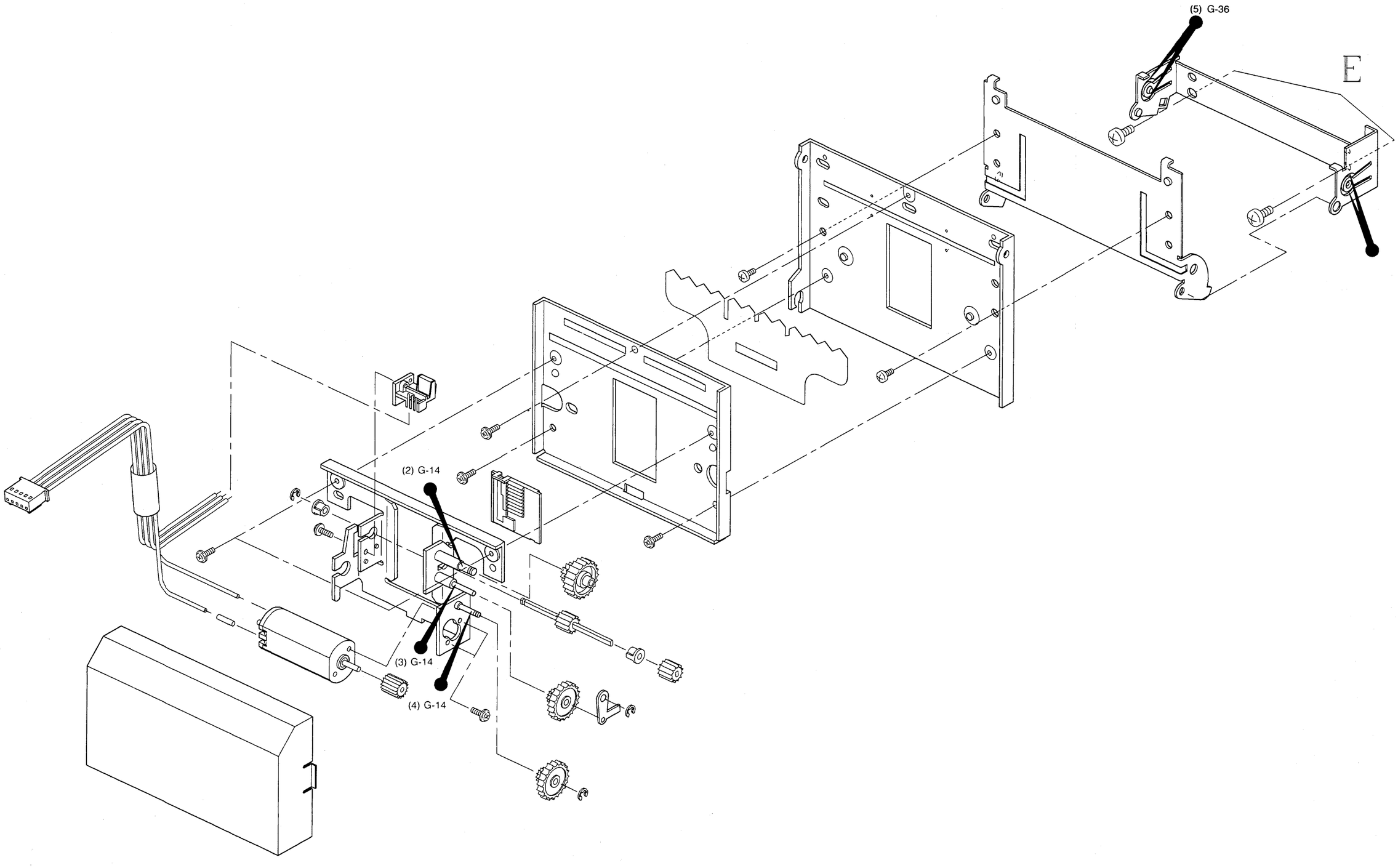


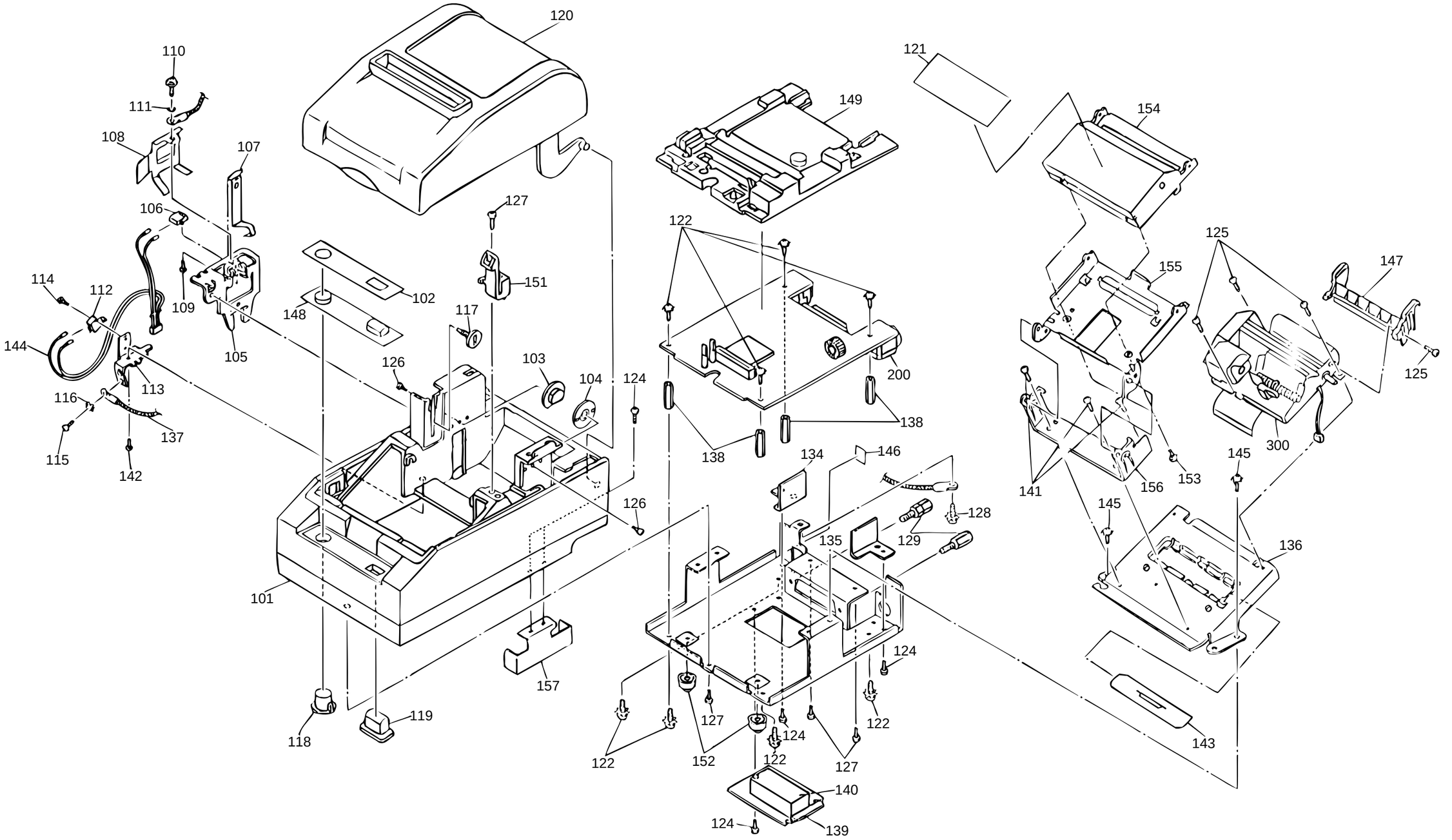
6.9 COMPREHENSIVE LUBRICATION AND ADHESION DIAGRAMS

Completed Unit



Auto Cutter Unit (Option)





"The exploded diagram is made based on the standard specification of our company.
When the part or unit indifferent from your specification is shown in the diagram,
please disregard it."

EXPLODED DIAGRAM FOR TM-T85

PARTS LIST

Item	Code No.	Parts Name	Specification	Q	R
	CASE BLOCK				
101	1906 3209	Case, Main, AA	1022922	1	X
102	1906 3210	Panel sheet, AA	1023418	1	C
103	1906 3211	Rolled paper shaft, Left	1006003	1	C
104	1906 3212	Rolled paper shaft, Right	1006004	1	C
105	1906 3213	Near-End detector frame	F244306010	1	X
106	1906 3214	Near-End detector ass'y	2003501	1	B
107	1906 3215	Near-End detector lever	F244306020	1	C
108	1906 3216	Near-End detector cover	1007212	1	X
109	1906 3217	C.B.T-B screw M2x5	1002584	1	X
110	1906 2108	C.P.S. screw M3x6	B300104211	1	X
111	1906 3218	Washer M3	B090600811	1	X
112	1906 3219	Micro switch	2001497	1	B
113	1906 3220	Sensor mounting plate	1005618	1	X
114	1906 3221	C.T-2.B screw M2x6	1006365	1	X
115	1906 2108	C.P.S. screw M3x6	B300104211	1	X
116	1906 3218	Washer M3	B090600811	1	X
117	1907 1146	Detector adjustment screw	C109302051	1	C
118	1906 3223	Key top, PS,AA	1022923	1	X
119	1906 3224	Key top,PF	1006002	1	X
120	1906 3225	Cover, Roll paper, AA	1023420	1	C
121	1906 3226	Caution seal, AA	1023421	1	X
122	1906 3227	C.P.(0) screw M3x6 F/ZN	B040450511	8	X
124	1906 2108	C.P.S. screw M3x6	B300104211	5	X
125	1908 7611	C.T.B.S. screw M2.5x5	B300202211	4	X
126	1906 3228	C.T.P. screw M2x5	B011400211	2	X
127	1906 3229	C.T.P. screw M3x8	B018101711	4	X
128	1906 3227	C.P.(0) screw M3x6 F/ZN	B040450511	1	X
129	1906 2119	Hexagon screw MM	X610220000	2	X
134	1906 3231	Assistant plate left	1006009	1	X
135	1906 3232	Assistant plate right	1006010	1	X
136	1906 3233	Plate, Mechanism	1022778	1	X
137	1906 3234	Earth wire	2003478	1	X
138	1906 3235	Spacer	1016893	4	X
139	1906 3141	IC cover	1006007	1	C
140	1906 3237	IC holde spacer	1006008	1	X
141	1906 2108	C.P.S. screw M3x6	B300104211	3	X
142	1906 3238	C.T.P. screw M3x6 F/ZN	B018101611	1	X
143	1906 3239	Sheet, Mechanism	1022779	1	X
144	1906 3240	Lead wire ass'y A	2003476	1	X
145	1906 2109	C.P.S. (0) screw M3x6	B302404211	2	X
146	1906 2126	Seal, Caution	1023411	1	X
147	1906 3241	Paper guide, Upper	1024613	1	B
148	1906 3242	Cover, Panel sheet	1023419	1	X
149	1906 3243	Cover, Circuit board	1025672	1	X
151	1906 3244	Lever, Hold	1025673	1	C
152	1906 3245	Case leg	1025674	2	X
153	1906 3246	C.P.Screw M3x5	B010103211	2	X
154	1906 3247	Cutter unit	1022806	1	A
155	1906 3248	Plate, Cutter sub ass'y	1022921	1	C
156	1906 3249	Cutter unit mount	1008467	1	C
157	1906 3250	Plate, Support	1026239	1	X

Notes: Q – Quantity used per unit
R – Rank

R – A : Essential
B : Stock recommended
C : Others
X : No stock recommended

Item	Code No.	Parts Name	Specification	Q	R
	CONTROL BOARD BLOCK				
200	1906 3251	Main circuit board ass'y A	2017380	1	A
CN1,CN6	1906 3252	Connector 5,1.25mm	2017356	2	C
CN2	1906 3253	Connector 4,1.25mm	2003281	1	C
CN3	1906 3254	Connector	2002930	1	C
CN4	1906 2133	Connector 3P	X600570300	1	C
CN5	1906 2130	Connector 25P	X600805210	1	C
CN8	1906 3255	Connector 5P	X600310500	1	C
CN9	1906 3256	Connector 27P	2000649	1	C
DSW1,DSW2	1906 2137	DIP switch	2014388	2	C
F1	1906 3158	Fuse 125V, 3A	2018738	1	A
QM1,QM2	1906 2145	Transistor array	2004446	2	B
Q4	1906 3160	P-CH FET	2015765	1	B
SW1	1906 3259	Push switch	2003331	1	B
SW2	1906 3260	Push switch	2003297	1	B
U1	1906 2174	Switching regurator IC	2014216	1	A
U10	1906 3261	PS-RAM	2016149	1	A
U14	1906 2172	Comparator IC	2012489	1	A
U15	1906 2153	Voltage regurator IC	2014222	1	A
U2	1906 3165	C-MOS IC	X461600808	1	A
U3	1906 2167	Transistor array	2003595	1	A
U4	1906 3263	Microcontroller (LSI)	2015764	1	A
U5	1906 3264	Gate array	2015358	1	A
U6	1906 2158	OP amp (IC)	2010103	1	A
U7	1906 2169	Reset IC	2003700	1	A
U8	1906 2163	RS-232C Driver/Receiver IC	2015476	1	A
U9	1906 3265	ROM	2017460	1	C
	PRINTER MECHANISM BLOCK				
300	1906 3266	Mechanism ass'y	103422	1	A

Notes: Q – Quantity used per unit
R – Rank

R – A : Essential
B : Stock recommended
C : Others
X : No stock recommended